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2 FEBRUARY 1984

USSR Report

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USSR REPORT

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MISCELLANEOUS

BRIEFS

BIOLOGICAL PLANT PROTECTION--The criticism contained in the review addressed to the Main Administration of the Microbiological Industry of the USSR Soviet of Ministers is acknowledged as being valid. In truth, the biological means of plant protection manufactured by Glavmikrobioprom enterprises are still inferior in quality to better samples. Measures are being taken to increase the output and to improve commercial forms and expanded assortment of these products. Thus, the technology of dendrobacillin production in the form of a wettable powder is being introduced at the plants. Studies are being completed on biotoxibacillin and gommeline in the same form. The production of a new lipedocide concentrate preparation is being organized. The technology of producing a fungus entomopathogenic preparation under experimental-industrial conditions have been mastered. The development of a technology for the experimental production of three preparations for combatting plant diseases recommended for industrial application according to state test results is being completed. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 43, Oct 83 p 2] 12322

UDC 633.18:631.82

PREDICTING EFFECTIVENESS OF MINERAL FERTILIZERS ON RICE PLANTINGS

Moscow DOKLADY VASKhNIL in Russian No 5, May 83 (manuscript received 13 Aug 82) pp 3-4

ALESHIN, Ye. P., corresponding member of VASKhNIL [All-Union Academy of Agricultural Sciences imeni V. I. Lenin], SYCHEV, V. P. and SHARIFULLIN, R. S., All-Union Scientific Research Institute for Rice

[Abstract] The present study seeks to determine optimum NPK amounts in mineral fertilizers with established constants of meadow-chernozem soil, the plant variety Krasnodarskiy 424 and 2-3 years of rice as the prior plantings. The authors assess the effects of nitrogen fertilizer ranging from 0 to 180 kg/ha with up to 90 kg/ha phosphorus and 50-70 kg/ha potassium. Field test results and subsequent data processing showed that from 10-50 kg/ha of nitrogen fertilizer brought 7.33-6.53 rubles additional income for every ruble invested; with 60-100 kg of nitrogen, the economic effectiveness fell to 6.36-5.32 rubles income per invested ruble, and with 110-150 kg the realized income gain was 4.76-3.26. Beyond that investment effectiveness was zero or worse. The authors stress that these results apply to particular soil, rice variety and rotation, and principles for other circumstances must be worked out individually. Figure 1; references 3 (Russian).
[071-12131]

UDC 633.11:631.527

INCREASING EFFECTIVENESS OF WHEAT SELECTION

Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 5, May 83 pp 2-6

VASILENKO, I. I., candidate of agricultural sciences

[Abstract] The role of selection centers and other scientific centers in the increase of grain production in 1981-1985 was discussed. These centers developed, submitted for state tests (in 1982), 27 new varieties and zoned 13 new varieties of winter wheat. The Mironovka Scientific Research Institute of Wheat Selection and Seed Growing has developed a program of studies of artificial climate installations and introduced new schemes of growing

selection material which speeds up the selection process and have studied photothermal mutagenesis and other methods of increasing wheat yields. Staff personnel of the Krasnodar Scientific Research Institute of Agriculture are studying transmitting loci of chromosomes which control resistance to brown rust from amphiploids for varieties of soft wheat obtained previously. The All-Union Genetic-Selection Institute has developed and approved a biophysical method of selecting frost-resistant genotypes from populations of previous generations of winter wheat. The All-Union Scientific Research Institute of Grain Economy is the site of work on selection of spring wheat. Immunologists of this institute have developed a method of determining activity of respiratory enzymes in infected heads of spring wheat sprouts. Kazakh Scientific Institute of Agriculture is creating monosomal lines and transferring chromosome 6B from the Timshteyn variety of Kazakhstan 126 and Kazakhstan 3 varieties. Selectors of the Main Botanical Garden have improved the method of intraspecies hybridization by crossing the best wheat-quack grass hybrids of foreign origin. The Far Eastern Scientific Research Institute of Agriculture is continuing development of a new method of determining the tolerance of wheat to brown rust without using infectious backgrounds. These are some of the projects being carried out in order to help increase grain production.
[014-2791]

UDC 633.11+633.14:631.424.86

TRITICALE SAMPLES RESISTANT TO STALK RUST AND BROWN RUST

Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 5, May 83 pp 19-20

BOGACHEV, Yu. I., candidate of biological sciences

[Abstract] samples of triticales from East Germany and the Czechoslovak Socialist Republic were studied. Resistance of these samples to stalk rust was assayed against natural and artificial infectious backgrounds in the field and against wheat brown leaf rust in the laboratory. Resistance to stalk rust was assayed by the Peterson, Stekman and Harrar scale, resistance to brown rust was assayed by the T. D. Strakhov scale. Artificial infection by stalk rust under field conditions showed a large quantity (95.8 percent) of samples from East Germany were immune to this pathogen. A sample from the Czechoslovakian Socialist Republic, ADD 66169, was most highly infected. Most East German samples were immune or nearly immune according to the Stekman and Harrar scale. Laboratory artificial infection showed that none of the samples were immune to stalk rust but they all were resistant to the 77th race of brown rust. The triticales from the GDR and CSSR identified as immune or highly-resistant to stalk and brown leaf rust can be used as initial material in selection work.
[014-2791]

UDC 633.11:632.938.1+582.285.2

USE OF PROTEIN MARKERS IN EVALUATING WHEAT FOR RESISTANCE TO BROWN RUST

Moscow DOKLADY VASKhNIL in Russian No 7, Jul 83 (manuscript received 5 Aug 82) pp 18-20

TYUTEREV, S. L., DUKHAREV, N. A. and KRUPNOV, V. A., All-Union Scientific Research Institute for Plant Protection; Scientific Research Institute for Agriculture of the Southeast

[Abstract] Hybridization of wheat with rye, couch grass and aegilops that are resistant to brown rust has been promoted by use of protein markers in the genetic systems. The present study considers the possibility of identifying and selective breeding of wheat with couch grass chromosomes in a substituted state. AS12 spring wheat was crossed with Saratovskaya 29 containing a pair of Agropyron intermedium chromosomes. The resulting hybrid was evaluated for rust resistance under hothouse conditions, with parallel electrophoretic study of gliadin in the grain endosperm and cytological analysis of chromosome composition. Couch grass chromosomes were identified in the substituted state in the hybrid's endosperm. Phytophathological study showed that only plants from certain halves of seed grains were susceptible to brown rust. The rust-resistant strains could be identified by the protein marker procedure in gliadins γ' [gamma one] and $\omega 7_2$ [omega seven-sub two] in hybrids containing couch grass chromosomes. Figure 1; references 9: 6 Russian, 3 Western. [072-12131]

BIOCHEMISTRY

NEW 'JOBS' FOR ENZYMES

Vilnius SOVETSKAYA LITVA in Russian 18 Sep 83

[Text] More than 150 years ago, scientists knew very little about enzymes, without which metabolism, and this means, also the existence of all life, would be impossible. Now more than a thousand of them are known. The list is being enlarged continually. What, then, are enzymes? Enzymes are cellular proteins of living organisms with unique properties. They sharply accelerate the reactions of splitting and synthesis of substances during metabolism. Their capability as catalysts to speed up processes by billions of times is well known. For example, a single enzyme molecule can decompose up to 5 million molecules of hydrogen peroxide in a minute. In the human body, with the participation of enzymes, thousands of reactions occur in a counted minute. New cells are born and the products of decomposed old cells are removed. Thus, food entering into an organism is broken down to more simple components convenient for assimilation.

In recent times science is advancing actively and finds new properties and effects of these, indeed magic, substances. Scientists of the Biochemistry Institute, LiSSR Academy of Sciences have contributed substantially to the expansion of the list of enzyme "jobs". This is what the Director of the Laboratory of Enzyme Chemistry of the institute, Doctor of Chemical Sciences, Yuozas Kulis told us:

It is known that, in the course of many reactions, where enzymes are applied as catalysts (accelerators), transfer of electrons occurs. In particular, photosynthesis takes place by such means: from carbon dioxide and water are synthesized sugar, aminoacids and other cell components. Various processes of life activity of organisms, let us say movement, also are the result of transfer of electrons in molecular biological structures. The scale of these processes is illustrated by such facts: annually on the earth nearly 100 billion tons of organic compounds are synthesized and broken down. In the course of these conversions, more than 10 million tons of electrons are transferred (at the molecular level). And all of this is accomplished with the participation of enzymes.

Scientists were faced with the task--clarify the mechanisms of electron transfer in protein systems and learn to control and utilize these powerful currents. Research revealed that in all cases the processes occur with the participation of many protein components, which exist in the cell in definite structures. It was found also that the two components of the electron transfer chain--the so-called physiological partners--do not interact haphazardly but are strictly regulated, which also is provided specifically by the primary structure of proteins. The mechanism of electron transfer, it was found, consists in the "tunneling" (infiltration) of electrons through the protein structure to active centers.

At the following stage of research, it was necessary to discover those conditions acting under which enzymes would secure the transfer of electrons to conducting materials. The greatest success was achieved with the immobilization, i.e., "fixing" the components of the electron-transport chain on modified electrodes. To assure prolonged functioning of the immobilized enzymes, methods of stabilizing them were developed, in other words, biocatalysts were created successfully which for more than a year did not lose their qualities when usually they lose their properties in the course of several days. The phenomena cited received greatest application in developing principally new methods of analysis. On its basis also were created and operated sensors of organic compounds--glucose, lactate, urea, insecticides, etc.

They have found application in various areas of the national economy. With the aid of sensors it is possible to quickly and precisely determine the concentration of glucose in blood, which permits the detection of diabetes. Dynamic changes in lactate during physical stress characterize the endurance of an organism or certain cardiac ailments. Increased amount of urea indicates kidney insufficiency. Assay of concentrations of glucose and other compounds is extremely necessary in the microbiological industry for control and management of the growth processes of microorganisms and in the food industry for standardization and evaluation of the quality of products. They also can be used widely for monitoring the status of the environment, in agricultural production, opening new possibilities in diagnosis and treatment of diseases, and creating new technologies. Such, by far, do not exhaust the list of new "jobs" of enzymes, opened by the application of sensors.

In conclusion, I wish to say that the experimental models of analyzers created in our institute were demonstrated at the USSR Exhibition of Achievements of the National Economy in Moscow, at the Leipzig fair in the GDR and at other international exhibitions. Serial production of the instruments is planned in the near future.

12321
CSO: 1840/108

UDC 591.484.3:547.963.3

EFFECTS OF FLASHING LIGHT STIMULI ON RNA LEVELS IN NEURONS AND OLIGODENDROGLIOCYTES OF FROG RETINAL GANGLION CELL LAYER

Leningrad TSITOLOGIYA in Russian No 6, Jun 83 (manuscript received 18 Mar 82) pp 678-682

KALININA, A. V., Scientific Research Institute of Applied Mathematics and Cybernetics, Gorky University

[Abstract] Cytophotometric studies were conducted on Rana ridibunda retinal ganglion cell layer to determine the effects of dark adaptation and flashing light stimuli (2 Hz, 70 lux for 2 h) on RNA levels in large neurons and accompanying satellite oligodendrogliocytes. In comparison with the dark-adapted state, light stimulation of the type described resulted in an increase in the RNA concentration of oligodendroglia cytoplasm by 28%, in the nucleus by 48%, and in the nucleolus by 35%. The corresponding values for the large neutrons were 50%, 36%, and 35%, respectively. These changes may reflect the greater metabolic stability of the glial cells, while the greater RNA concentration in the cytoplasm in comparison with the nucleus may indicate that responsibility for synthesis of reserve RNA may have shifted from the nucleus to the cytoplasm. Although these observations confirm the fact that the "working" neuron synthesized RNA, this communication also constitutes the first report of a similar change in the glial cells. References 14: 9 Russian, 5 Western. [123-12172]

UDC 616.98:578.833.27]-078.73

STUDIES ON NATURAL FOCI OF TICK-BORNE ENCEPHALITIS USING PASSIVE HEMAGGLUTINATION

Moscow VOPROSY VIRUSOLOGII in Russian No 3, May-Jun 83 (manuscript received 25 Jan 82) pp 313-315

NIKOLAYEV, V. P. and SHMIDT, O. A., Military Medical Academy imeni S. M. Kirov, Leningrad

[Abstract] Passive hemagglutination was found to be an effective and efficient method for detection of tick-borne encephalitis (TBE) virus in brain suspensions of infected suckling mice and of infected Ixodid ticks, as well as in nutrient media of infected cell cultures. Specificity was demonstrated by negative results with Omsk hemorrhagic fever virus. However, passive hemagglutination inhibition tests conducted on human sera showed cross-reaction between TBE and Omsk fever, indicating that care must be exercised in interpreting the results of serologic surveys. References 6: 5 Russian, 1 Western. [138-12172]

UDC 578.833.29

HEMORRHAGIC FEVER-RENAL SYNDROME VIRUS: NEW REPRESENTATIVE OF BUNYAVIRIDAE

Moscow VOPROSY VIRUSOLOGII in Russian No 3, May-Jun 83 (manuscript received 10 Dec 82) pp 330-333

DONETS, M. A., REZAPKIN, G. V., KOROLEV, M. B. and TKACHENKO, Ye. A., Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow

[Abstract] Physicochemical characterization is presented of the hemorrhagic fever-renal syndrome virus isolated from the lungs of a red field vole (Cl. glareolus). A ribonucleoprotein complex that was fairly resistant to the effects of RNAse was isolated and calculated to have a sedimentation coefficient of 20-30 S. The buoyant density of the virus in sucrose was 1.14-1.15 g/cm^3, and 1.24-1.25 g/cm^3 in cesium chloride. Electron microscopy revealed 90-105 nm

round or oval particles within a lipoprotein envelope that were morphologically reminiscent of other Bunyaviridae, particularly the Crimea-Congo hemorrhagic virus. It appears, therefore, that the hemorrhagic fever-renal syndrome virus constituted yet another entity in the Bunyaviridae family. Figures 7; references 7: 1 Russian, 6 Western.
[138-12172]

UDC 616.831-002-022:578.833.26]-092.9-078:578.53]:612.017.1-019

RELATIONSHIP BETWEEN ANIMAL GENOTYPE AND VIRAL STRAIN CHARACTERISTICS IN DETERMINING COURSE OF EXPERIMENTAL TICK-BORNE ENCEPHALITIS

Moscow VOPROSY VIRUSOLOGII in Russian No 3, May-Jun 83 (manuscript received 10 Jun 82) pp 345-348

LARINA, G. I. and LEVKOVICH, Ye. N. (deceased), Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow

[Abstract] Studies were conducted on the course of experimental tick-borne encephalitides in relation to viral strain and genotype of the host animal, employing CBA and C57B1 mice and tick-borne encephalitis (TBE) viruses differing in virulence. Employing intracerebral, subcutaneous, and intraperitoneal injections of the viruses showed that on intracerebral injections the two lines of mice did not differ in susceptibility and the viruses multiplied to an essentially equal extent regardless of strain. However, significant differences became apparent with peripheral routes of injection. The C57B1 mice were much more susceptible in clinical terms and the viruses showed more extensive multiplication in this line than in the CBA mice which launched a much more pronounced immune response against the viruses. The viruses also differed in the intensity of the immune reponse that they evoked. References 6: 5 Russian, 1 Western.
[138-12172]

UDC 577.21

CLONING cDNA, CONTAINING mRNA SEQUENCES OF ALPHA$_{s1}$-BOVINE CASEIN

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 271, No 6, Aug 83 (manuscript received 1 Jun 83) pp 1502-1504

KERSHULITE, D. R., IVANOV, V. N., KAPELINSKAYA, T. V., KALEDIN, A. S. and GORODETSKIY, S. I., Institute of General Genetics, USSR Academy of Sciences, Moscow (Presented by academician N. P. Dubinin, 8 May 83)

[Abstract] The structural organization of the genes of the several caseins [e.g., α, β and κ-caseins] is not known; it can be ultimately established by analysis of genome DNA. To obtain a probe necessary to carry out such an analysis, the authors cloned κDNA which was obtained on a matrix of mRNA from bovine mammary gland tissue. An enriched fraction of mRNA from bovine mammary glands (on 20-40th day of lactation) was used to construct recombinant clones which contain DNA-copies of nucleotide sequences of mRNA of the caseins. κ DNA was synthesized from fractions containing 10-18 S RNA. The plasmid DNA of the isolated clone contained part of the nucleotide sequence coding glpha$_{s\ 1}$-casein from cows. Insertion of kDNA of this clone may serve as a hydridized probe to isolate the gene of bovine casein from gene libraries. Cloning casein genes will make it possible to establish their structure and organization of both the coding and regulatory regions. Figures 3; references 10: 1 Russian, 9 Western.
[060-2791]

UDC 575.2

DOUBLING MUTATION FREQUENCY IN MAN

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 271, No 5, Aug 83 (manuscript received 27 Apr 83) pp 1242-1246

DUBININ, N. P., academician, Institute of General Genetics, USSR Academy of Sciences, Moscow

[Abstract] The last 50 years have seen significant increases in environmental pollution that has damaged DNA in somatic cells. Ionizing radiation and chemical mutagens are particularly harmful and numerous. The author presents

data to show that the dominant and semidominant mutations that appear in any generation can mean that, while with acceptable environmental conditions each generation produces the succeeding generation from normal specimens, if high pollution brings increased mutagens, then the number of mutation-bearing egg cells could conceivably reach 100%. Next, he turns to the dangers of radiation, pointing out that presently US radiation levels cause 5.4% of mutations, while in Europe they account for 5.7%. Citing the mutations caused at Hiroshima and Nagasaki, he concludes that a general nuclear war would bring mutation resulting in 100% negative changes in the succeeding generation, leading ultimately to the genetic destruction of humankind. References 15: 2 Russian, 13 Western. [059-12131]

UDC 577.3

STUDY OF SECONDARY DEFECTS IN HUMAN DNA WHEN DNA REPAIR SYSTEMS ARE DAMAGED

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 271, No 5, Aug 83 (manuscript received 21 Feb 83) pp 1250-1253

KOROTKOV, Ye. V., PRONINA, N. V., LASHKOVA, D. L., MUTOVIN, G. R., AKIF'YEV, A. P., KNYAZEV, Yu. A., KRUGLYAKOVA, K. Ye. and EMANUEL', N. M., academician, Institute of Chemical Physics, USSR Academy of Sciences, Moscow; Second Moscow Medical Institute imeni N. I. Pirogov

[Abstract] The combination of kinetic and physicochemical methods in studying various biological systems is perfected here using a kinetic formaldehyde approach. The approach is applied to study ataxia-teleangiectazia, Fanconi anemia, Down's syndrome and certain other ailments, particularly ones where failure of DNA repair leads to malignant tumor development, premature aging and neurological disturbances. The spontaneous and induced chromosome aberrations accompanying such ailments were studied in secondary DNA structure. The DNA was obtained from lymphocytes of peripheral blood of sick and control subjects, and analyzed after treatment with purified formaldehyde at 56°C. Electrophoresis of DNA in neutral and alkaline agar gels showed that single-thread breaks accounted for only 10-15% of all secondary DNA defects. The failure of DNA repair might be related to either natural mutagenic factors or increased genome instability. Heterozygote carriers of the indicated ailments could not be considered completely normal because of their secondary DNA defects. References 9: 7 Russian, 2 Western. [059-12131]

UDC 576.809.51

REACTIVATION OF UV-IRRADIATED PLASMID-TRANSFORMED DNA WITH CELLS OF SACCHAROMYCES CEREVISIAE YEAST

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 272, No 3, Sep 83
(manuscript received 15 Mar 83) pp 710-712

BEKKER, M. L., KOZHINA, T. N. and SMOLINA, V. S., Leningrad Institute of Nuclear Physics imeni B. P. Konstantinov, USSR Academy of Sciences

[Abstract] Host cell reactivation of UV-irradiated plasmids has been used in studying reparative mechanisms of cells. The present study presents data showing that cells of Sacch. cerevisiae are able to reactivate transformed plasmid DNA after ultraviolet irradiation and that the phenomenon is dependent on the system of excision reparation of the host's cells. The study was conducted using hybrid haploid strains of the yeast based on UV-sensitive rad2 and a hybrid containing mutations at leu2 and ura3. Other procedures used in the experiment with irradiated and unexposed DNA plasmid eliminated fluctuation of absolute transformant values and made it possible to establish the optimum concentration of plasmid DNA at 7 mcg and 10^8 particles of protoplast. Noncellular extracts of a number of defective yeast mutants in pyrimidine excision, including rad2, were found capable of incising UV-irradiated isolated DNA plasmids of ColE1 as effectively as wild strains. Another factor in survival and host cell reactivation was the reduction of the capacity of calcinated yeast protoplasts to reactivate plasmid DNA after UV-irradiation. Yeast was found to be as capable of such reactivation as are bacteria and animal cells. Figures 2; references 15: 5 Russian, 10 Western.
[052-12131]

UDC 579.887.9 (Legionella pneum)]:579.61:616.381-008.853.097

INTERACTION IN VITRO OF LEGIONELLA PNEUMOPHILA WITH GUINEA PIG PERITONEAL MACROPHAGES

Moscow IMMUNOLOGIYA in Russian No 4, Jul-Aug 83 (manuscript received 13 Nov 81) pp 53-58

YERUSLANOV, B. V., TARTAKOVSKIY, I. S., KOKORIN, I. N. and PROZOROVSKIY, S. V., Institute of Epidemiology and Microbiology imeni N. F. Gameleya, USSR Academy of Medical Sciences, Moscow

[Abstract] A study of interaction of guinea pig peritoneal macrophages with virulent and avirulent L. pnuemophila cultures, the effect on macrophages of antigens isolated from cultures of different virulence, the protective effect on infected macrophages of sera obtained from L. pneumophila culture and antigens isolated from it showed that the virulent L. pneumophila culture and antigens isolated from it possess a clearly pronounced toxic effect on a culture of intact guinea pig peritoneal macrophages. Antisera to a homologous virulent strain or to type-specific antigens isolated from it had a pronounced protective effect on macrophages infected or processed by the antigen. Cultures of macrophages obtained from guinea pigs immunized by a sublethal dose of the virulent strain or its antigens were resistant to the toxic effect of virulent strains of various blood groups. There was assumed to be definite differences between the protective capabilities of humoral and cellular factors of immunity in relation to virulent cultures of L. pneumophila of different serological groups. Figures 4; references 11: 3 Russian, 8 Western.
[028-2791]

UDC 547.964.4

NOVEL IMMUNOSTIMULATORY PEPTIDE

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 8, Aug 83 (manuscript received 13 May 83) pp 65-71

CHIPENS, G. I., VERETENNIKOVA, N. I. and NIKIFOROVICH, G. V., Order of the Red Banner of Labor Institute of Organic Synthesis, Latvian SSR Academy of Sciences

[Abstract] A brief survey is presented of the current status of rigin [Derived from Riga], a new peptide with immunostimulatory properties. The rigin sequence

(glyOgln-pro-arg) represents the 341-344 amino acid sequence of IgG H chain, and structurally has several conformations similar to those of tuftsin. The biological activities of rigin include enhancement of antibody formation, activation of phagocytosis, and potentiation of the cytotoxic activity of T killer cells. Rigin has been shown to induce elevation of blood lysozyme levels, and cell receptors specific for rigin have recently been identified. The biosynthetic mechanism for rigin synthesis appears to consist of limited proteolysis of the IgG H chains by trypsin-like enzymes. Figures 5; references 19: 8 Russian, 11 Western.
[117-12172]

COMPLEX HEART OPERATION CONDUCTED WITH LASER

Moscow KOMSOMOL'SKAYA PRAVDA in Russian 26 Aug 83 p 1

[Article by G. Konchyus, correspondent: "Lightning in the Heart. For the First Time in the World Soviet Surgeons Have Conducted a Complex Operation with the Aid of a Laser"]

[Text] At age 40, in the very bloom of vigor, worker I. F. felt ill. A scientifically scant and austere medical diagnosis stated: A shimmer in the auricle. He suffered three years from heavy attacks, lasting several days, and intolerable pain from which he was rescued only by loss of consciousness. Medical agents by this time were powerless. He knew: an operation was in prospect. A complex one with complete cessation of the heart and with switching on of apparatus for artificial circulation of blood. No one in all the world knew another way to alleviate the suffering of the illness. I. F. wanted the operation. But, for some reason, the physicians were not in a hurry to set the day...

But at this time in Moscow, in the Institute of Physics imeni P. N. Lebedev USSR Academy of Sciences, the Director of the Laboratory of Laser Surgery, Professor R. Ambartsumyan together with scientific associates Ye. Markin and Ye. Koshelev prepared the laser apparatus created by them for new work. It was going to fulfill the role of scalpel.

The methodology of a similar operation had been carefully worked out by Lithuanian surgeons together with professors O. Skobelkin and Ye. Brekhov at the surgery clinic and laser laboratory of the 51st Moscow City Hospital.

At the clinic of the Kaunas Medical Institute, Corresponding Member USSR Academy of Medical Sciences Professor Yu. Bredikis, together with Candidate of Medical Sciences V. Obelenis, collected and analyzed incoming information from colleagues and created the technology of the operation. For the first time in medical practice, they proposed restoring the cardiac rhythm of a human by a completely new method--with the aid of a laser.

And on a day, not completely beautiful, but full of anxiety and hope, they said: Tomorrow!

The laser radiation, along a flexible glass fiber, lasts but an instant in the heart cavity. The scalpel-flash dissects the so-called His bundle. And that is all. Neither cessation of the heart nor switching on of artificial circulation of blood were required. The very complex operation, which earlier required hours, was concluded after only several minutes. Normal cardiac rhythm was restored. The patient was rescued.

I already know many people who call Professor Yurgis Bredikis their rescuer. The initiator of the method of electrostimulation of the heart in our country, he widely applies the methods of electronics in cardiology and has created a whole series of instruments for medicine. The high appraisal of the work of Kaunas cardiologists has become such that, at the initiative of the UN World Health Organization, one of the three centers in Europe for investigation of ischemic heart disease was created in Kaunas. In the opinion of specialists, the first operation by laser in cardiac surgery has very great prospects.

...Now, at the time I w rite these lines, patient I. F. is being discharged from the hospital in good condition.

12321
CSO: 1840/108

SURGEON AND LASER

Moscow IZVESTIYA in Russian 7 Sep 83 p 3

KONOVALOV, B., "IZVESTIYA" science reviewed

[Abstract] Some aspects of the growth of the use of lasers in medicine are discussed and some problems which must be solved in the Soviet Union to continue this growth and development are described briefly. Aspects cited include: the use of lasers in dentistry, the role of physicists in laser surgery, collaboration of physicists and physicians at the Moscow Municipal Hospital laser surgery laboratory, use of laser during treatment without opening a body cavity, evaporation of some purulent formations with aid of a laser, use of the laser in making and attaching skin flaps and use of laser to sterilize wounds. A need for simpler and cheaper laser devices is cited; need for more specialists in this area is emphasized and need for increasing laser equipment output is mentioned. Laser surgery is credited with reduction of mortality from gastro-intestinal surgery by a factor of 3 to 5; reduction of work time lost by 20 days per patient and reduction of length of treatment in purulent surgery by a factor of 1.5 to 2. The "Skal'pel" laser device is saving 400,000 rubles per annum and the "Romashki" device is saving 700,000 rubles per annum. Creation of an All-Union Center of Laser Medicine is recommended. [092-2791]

UDC 612.843.7:66.085.11.621.375.826

PHYSIOLOGICAL REGULARITIES OF VISUAL PERCEPTION OF STIMULATED INFRA-RED RADIATIONS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 235, No 6, 1977 (manuscript received 22 Jan 77) pp 1459-1461

SAVIN, B. M. and KOLCHIN, Ye. Ye., Scientific Research Institute of Labor Hygiene and Occupational Diseases, USSR Academy of Medical Sciences, Moscow

[Abstract] Previous research had shown that laser radiation pulses are perceived as bursts of chromatic light with a wave length one half that of the initial burst. An attempt was made to establish physiological regularities of this phenomenon. Thresholds of visual perception of laser radiation with

wave length λ=1.06 μm and durations of 0.5 msec (10 subjects) and 15 μm (9 subjects) at different levels of adaptation and changes of sensitivity of the nacular region of the retina to infra-red light were studied. Data obtained showed that visual perception of pulsed coherent infra-red beams is quite similar to perception in ordinary light. This similarity holds true for all levels of the visual system from reception to synthesis of visual information. These data confirm the previously proposed assumption of the possibility of perceiving infra-red radiation being associated with peculiarities of primary processes of absorption of energy of laser infra-red radiation in photoreceptors structures. Figures 3; references 8: 2 Russian, 6 Western. [111-2791]

UDC 612.112.94-088.1:543.426

LASER CYTOFLUOROMETRY IN STUDYING LYMPHOID CELLS

Moscow IMMUNOLOGIYA in Russian No 4, Jul-Aug 83 (manuscript received 11 Mar 82) pp 87-91

SEROV, A. A., Institute of Immunology, USSR Ministry of Health, Moscow

[Abstract] A review of the literature is used to examine the basic possibilities and inadequacies of laser flow cytofluorometry used to analyze and classify some immunocompetent cells. The laser cytofluorography method is discussed. A diagram of a laser cell sorter is presented and described. Laser flow cytofluorometry makes it possible to isolate and identify required cell populations with a higher degree of purity than is possible with the use of other methods. Figure 1; references 45: 9 Russian, 36 Western. [028-2791]

MARINE MAMMALS

WHEN A DOLPHIN SLEEPS, OR HEMISPHERE ON WATCH DUTY

Moscow NAUKA I RELIGIYA in Russian No 9, Sep 83 pp 31-32

[Article by A. Supin, doctor of biological sciences (Institute of Evolutionary Morphology and Ecology imeni A. N. Severtsov, USSR Academy of Sciences)]

[Text] All people sleep more or less the same--the animal kingdom demonstrates the most variegated pattern of sleep. Each species sleeps in its own way. A frog can become immobilized in the most unsuitable, in our opinion, position, for example, as if ready to jump, and stay that way for half a day. A snake coils itself in a circle. A lion prefers to lie on his back and cross his legs on his chest. The elephant lies on its belly, leaning its head on its tusks, while the mountain goat, which is the owner of large and heavy horns, must bend its head backward, also lying on its belly. The goat's chin sticks up, just like people who will do anything, for the sake of vanity, to get a smooth tan on their neck. The chimpanzee adores to sleep in a clean bed: every evening it builds a fresh hammock-nest out of branches and leaves. Oxen sleep while standing.

Some sleep or drowse all night and all day, others appear never to lie down. The cuckoo fusses about something around the clock. Sharks dash about in the water as if possessed day and night: their gills supply them with oxygen only when water streams through them at high speed. Most likely, they sleep for short periods at a time.

What about the dolphin? This is the greatest mystery. The dolphin is not a fish, but a secondarily marine mammal, the descendant of animals that inhabited water many millions of years ago, then moved to land and then, for reasons that are not quite clear to us as yet, returned to their former element. It does not breathe through gills but lungs, which is how it should be for a mammal. But its very process of breathing is organized in a special way. Man or any mammal does nothing special to breath, it all happens by itself, automatically. But there is no automatic element in the dolphin for breathing. In order to perform a "respiratory act" it has to swim up to the surface of the water, open a special valve, exhale and inhale, close the valve and dive down deep with a supply of oxygen (the dolphin usually spends about 5-10 min under water; some of its relatives, for example, sperm whales, can spend 1 hour in water).

It is impossible to combine all these surfacing movements, closing and opening valves with the carefree muscular relaxation inherent in sleep. For even if these are not entirely conscious acts, they are at any rate purposeful actions that require the coordinated function of muscles and corresponding parts of the brain. So the question is begged: when and how does the dolphin sleep, when he has to choose between sleeping and breathing?

For a long time there were three hypotheses. Either it sleeps from one inspiration to another, and some chemical regulator commands it to wake up, when it reacts to changes in oxygen composition of air that was inhaled. Or it sleeps like a sleepwalker, with muscles tensed for movement, which is unlikely, since a sleepwalker does have abnormal sleep and, to some extent, this is pathology. Or else, finally, it does not sleep at all, does not need it, and that's all there is to it.

Only the recording of cerebral action currents would help solve the mystery. As the reader perhaps knows, the waking electroencephalogram has its own pattern and the sleeping one also has one of its own, even every stage of sleep has a pattern of its own. Of course, it is not so simple to take an EEG on a dolphin, but we finally succeeded in doing this. There is a biological station on the Black Sea belonging to our institute, where dolphins can be studied in a pool or in pens, right in the sea. We conducted the experiments with Lev Mukharamovich Mukhametov, candidate of biological sciences. We implanted electrodes (which is not a simple matter, because the dolphin's anatomy is unique, and you cannot find the best place to derive potentials right away) in both hemispheres of the dolphins (there were 14 bottlenosed dolphins and 5 common porpoises), and started the recording. We made the recording with use of wires, having picked a cable that would not prevent the dolphin from frolicking, as well as by remote control, via radio, just like cosmonauts are tested.

The results turned out to be utterly unexpected: the dolphin sleeps, like all mammals, for several hours but ... at the same time it is awake. The hemispheres of its brain sleep in turns! First one falls asleep and the other stays awake. Then, after an hour or two, the second one falls asleep and the first one "takes on the watch," controls respiration and all movements. This was a real discovery. How wise nature is, how brilliantly it arranged the reserves contained in the paired structure of the brain. So this is why the dolphin closes first one eye, then the other; this had been noticed by many before, but no one even guessed that the closed eye was sleeping.

At the first stage, both hemispheres can drowse, but as soon as sleep develops and becomes deep, one will always wake up. The hemisphere has the usual, "slow" sleep, during which there is prevalence of delta waves on the EEG. It sleeps without dreams: no REM sleep with the eye movements inherent in dreaming has been found in the dolphin. Perhaps it would be a burden for it to dream, since the dolphin has something to look at with the waking eye and it has enough visual impressions while asleep as it is. Its brain must not be overstimulated, as it happens while dreaming, so that it can rest properly and gather strength. After all, the dolphin sleeps only half the usual time altogether. Interestingly, the total daily amount of slow-wave

sleep is always longer in one hemisphere than the other. This is no doubt a reflection of the functional asymmetry of hemispheres, although we still do not know how they are specialized in the dolphin.

There is no doubt that single-hemisphere sleep serves to provide for the dolphin's breathing. It is interesting to note, incidentally, that pinnipeds--the Caspian seals, which also breathe through the lungs, sleep quite well while floating if the sea is calm, and their sleep is of the ordinary type, including both hemispheres, with a rapid-sleep phase and with dreams. One of the mysteries of the dolphin, this champion of quick-wittedness in the animal kingdom, has been solved. True, it is not the last mystery, and studies are continuing.

10,657
CSO: 1840/113

ATTENTION FOCUSED ON DOLPHINS

Moscow V TSENTRE VNIMANIYA--DEL'FIN (NOVOYE V ZHIZNI, NAUKE, TEKHNIKE: SERIYA BIOLOGIYA) in Russian No 9, Sep 83 (signed to press 26 Jul 83) pp 2, 33-42, 64

[Annotation by Prof A. V. Yablokov, doctor of biological sciences, and V. M. Bel'kovich, doctor of biological sciences, chapter and table of contents from book "Attention Focused on Dolphins (News in Life, Science and Technology: Biology Series)" by Aleksandr Yakovlevich Supin, doctor of biological sciences, edited by I. Tuzhilina, Izdatel'stvo "Znaniye", 42,460 copies, 64 pages]

[Text] Aleksandr Yakovlevich Supin, doctor of biological sciences, heads a laboratory at the Institute of Evolutionary Morphology and Animal Ecology, USSR Academy of Sciences. He has authored many scientific works and several monographs. He has been engaged for over 15 years in the study of behavior, nervous system and sense organs of dolphins. For many years he has been pursuing popularization work in the "Knowledge" [Znaniye] Society. This pamphlet tells about the distinctions of dolphins, why they interest scientists in different fields, the principal problems in this area--complex behavior of these animals, their sense organs, function of acoustic echolocation apparatus, unusual nature of sleep and relations between man and dolphins. The pamphlet is intended for a wide circle of readers.

Acoustic Locator

It is difficult for us to even imagine how one can orient oneself in the environment without sight. But only terrestrial beings can use sight well. Everything is more complicated for marine animals. It is all a matter of transparency of water. Even in very clean water, visibility does not exceed tens of meters, and if the water is cloudy or contains many minute organisms swimming deep in water, visibility could be only a few meters or less. In addition, water absorbs to an appreciable extent the sunlight falling from above, which is why it is always twilight at several tens of meters in depth and total darkness at deeper levels. Under such conditions, vision may not be useful at all times by far.

However, nature has given dolphins a remarkable device, thanks to which they can orient themselves very well, even when sight is useless, in cloudy water or total darkness. We refer to their acoustic locator [sonar] (Figure 6).

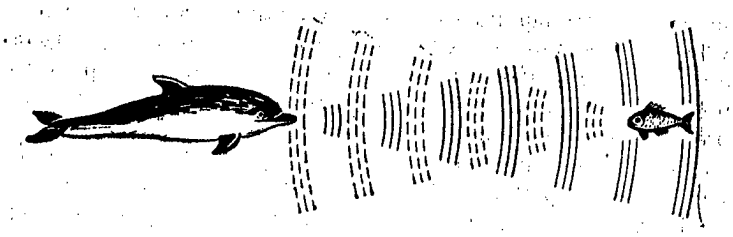

Figure 6. Principle of operation of delphinid locator--emission of sonic waves that spread in front of the swimming animal; any obstacle in the way (for example, a fish) is reflected by the sonic waves and returned to the dolphin, which hears the echo and thus detects the object that caused the sound to be reflected

The acoustic locator operates on a simple principle. While swimming in water, the dolphin emits special sounds. As they spread in the water in front of the dolphin, they can encounter some objects and be reflected by them. The reflected sound spreads in the opposite direction, an echo appears, and it can be heard by the dolphin. The dolphin can determine very accurately from the nature of the echo what is in front of it--clean water or some sort of objects, and which objects: fish, stone, another dolphin or something else. This is the sonic (acoustic) locator.

The locator's sounds are audible if one has occasion to swim close to a pod of dolphins: they consist of short, sharp clicks that are sometimes heard individually, but most often emitted in long "trains," merging into the typical crackle or squeak. The capabilities of the dolphin's locator are amazing. With it, the dolphin can detect objects 1 kilometer away, but it can also "examine" in detail something in its immediate vicinity. It can identify, distinguish the most varied objects from one another, and obtain complete and accurate information about its surroundings.

In many cases, the dolphin uses its locator to obtain even fuller and more accurate information about the environment than we can with vision, which gives us information only about the surface of objects, but tells us nothing at all about what is inside them. When looking at an object, we cannot say whether it is solid or hollow; when looking at two objects of the same color, we cannot determine whether they are made of the same or different materials. But these limitations do not exist for the dolphin's acoustic locator. The sound waves can penetrate deep into objects, pass right through them, and then there is a reflection of sound not only from an object's surface, but its internal elements. We see that the nature of the echo depends not only on the shape and surface of an object, but its internal structure. And since this is so, by listening to this echo the dolphin receives information about both the external and internal structure of objects. For this reason, the dolphin has no difficulty in distinguishing between, for example, two objects of the same outward appearance, but made of different materials: different materials reflect sound differently, and the dolphin hears this well. The dolphin can easily distinguish between a solid body and one of the same appearance, but

hollow: the inside cavity also reflects sound, and for this reason the dolphin learns right away that it exists.

Incidentally, in one of the preceding chapters we discussed the fact that a dolphin immediately recognizes a human in water, since he has lungs in him filled with air, which are the same as in other dolphins. Now we understand how the dolphin finds this out: air-filled lungs constitute a cavity that reflects sound well and is easily recognized by the dolphin when it "feels" a man with its sonar.

Although the basic principle of operation of the dolphin's sonar is clear (listening to the echo from sounds emitted by the dolphin itself), we are still far from understanding all of the details about the function of this system. For if an untrained person was blindfolded and tried to orient himself in his surroundings by listening to the echo from the sounds he emits, of course he would fail. We simply do not hear the echo from most of the objects around us, although virtually all of them do reflect sound. We see that this is only simple in discussion, to orient oneself with the help of echoes, while in fact this is far from a simple task. Yet the dolphin is somehow able to orient itself in this way, and it is very important to find out exactly how it does it. For if we understand how the dolphin identifies different objects from a reflected sonic signal, it would help us perfect the sonar and radar equipment we made with our hands, to "teach" these instruments to identify the objects they detect just as well. Some aspects of this problem are gradually growing clear thanks to the joint efforts of many scientists.

When the ranging sound emitted by the dolphin reaches some object, the nature of the reflected sound (echo) depends on many of the object's properties. It depends primarily on shape and size: every facet, every side of an object reflects sound in some direction, depending on its position, and the overall reflected sound is determined by the entire shape of the object. The reflected sound also depends on the nature of the surface: smooth surfaces reflect sound in one direction, like a mirror, while uneven surfaces scatter sound in different directions. It also depends on the material of which the object is made: different materials have different capacities with respect to reflecting or absorbing sound. The presence of more compact parts in an object (for example, the skeleton inside an animal) or, on the contrary, less compact parts (cavities) also affects the nature of the reflected sonic signal, as we have already discussed. There are several more features of an object that also affect the nature of the echo in some way or other. For this reason, when the same sound comes to different objects, the sounds reflected from them will be different: each object has its own echo. Each object acquires its acoustic portrait, acoustic image. And the dolphin distinguishes between these acoustic images very well, identifying from them all of the details of his surroundings.

But it is not at all simple to hear and distinguish reflected sound. Sound spreads in water at the rate of 1.5 km/s. If a dolphin is several meters away from the object it is ranging, for example, 7.5 m, the sound will reach the object in 5000ths of a second (5 ms) and will return within the same time. This means that the dolphin has to discern an echo that will return to it

after a 100th of a second (10 ms). And if the distance to the object is 1 m, the echo would return even sooner, in about 1.3 ms. With such a short interval, the reflected sound could simply merge with the sound emitted by the dolphin and the echo may not be heard.

For this not to occur, in the first place, the emitted sound must be very short, less than 1000th of a second. In the second place, the dolphin's auditory system must be capable of hearing separately two sounds following one another at such a short interval. For in an ordinary situation we do not hear the constantly appearing echo from all the objects around us expressly because it merges with the sounds that we ourselves emit. And this is so, in spite of the fact that sound spreads in air one-fifth as fast as in water. The time required for a sound to reach a wall 15 m away from us and, being reflected, return is 0.1 s, and even with this interval we do not discern well the echo. Yet the dolphin has to discern sounds at intervals that are 100 times shorter!

As difficult as this is, the dolphin's auditory system copes with the task. The clicks that dolphins use for ranging are exceptionally short, their duration may constitute 10,000ths and 100,000ths of a second. And the acoustic centers of the dolphin brain acquired the capacity to discern sounds following one another at incredibly short intervals, less than 1000th of a second. This means that the dolphin's capacity to discern signals in rapid succession is tens of times greater than this capacity in other animals and man. It is only thanks to such phenomenal capacity of the dolphin's auditory system that it is possible for its sonar to function well.

Nature had to resort to many tricks to have the dolphin's locator function impeccably. In the preceding section we stated that the dolphin's auditory system can perceive sound waves at exceptionally high frequencies, up to 200,000/s. Such a unique hearing capacity also developed in dolphins because of the requirements imposed by its sonar. The fact of the matter is that in order to detect and identify some object by means of sound waves, the size of this object must be larger than the length of the sonic waves. If the object is smaller than half the sonic wave, the waves will simply go around the object and travel farther, without being retained or reflected from the object. Hence it is apparent that the smaller the objects or parts of objects that must be discerned, the shorter the sonic waves used. But the higher the frequency of sonic oscillations, the shorter the sonic waves: the length of a wave equals the quotient from dividing the speed of sound (let us recall that, in water, it is 1.5 km/s) by the oscillation frequency. In order to obtain a wave with a length of 1.5 cm, the oscillation frequency must be 100,000/s and for a 1-cm wave, 150,000/s. The dolphin has to use expressly such sound wave frequencies in its sonar. Otherwise it would simply be unable to discern the fine details of ranged objects. But since such high-frequency sounds are emitted by the dolphin, it also has to hear sounds at the same frequency, up to 200,000/s, and its auditory system has adapted to perception of such incredibly high sounds.

The dolphin not only hears well the sounds reflected from objects, it can also control sounds emitted by its sonar and thereby improve its performance. If

it is necessary to detect objects that are very far away, the dolphin can emit clicks as loud as a pistol shot; in the time that the sound travels to a distant object and returns, it is markedly attenuated, and in order to hear the echo, the emitted sound must be very loud. And if it is necessary to "feel" objects that are close, such a loud sound is not needed at all, it would only deafen the dolphin; in this case, the dolphin immediately reduces the volume of the clicks it emits.

The frequency and other characteristics of sounds can also be changed. It can happen that it is more convenient to probe different objects with different sounds to obtain the fullest information about the properties of these objects. And the dolphin makes skillful use of these possibilities. Like the person in charge of lighting in a theater, who adjusts the light and turns on different banks of lights, so that the principal element is singled out, illuminated, so dolphins, as they adjust their sonic projector, "illuminate" the most important, principal properties of objects.

Incidentally, how do dolphins emit sounds in general? This would seem a superfluous question, since all mammals and man have a good vocal system, with which all sounds are emitted that are needed for communication and other purposes; why then should the dolphin not have a voice? But the fact of the matter is that the dolphin cannot use the same vocal system as other animals. And all this is due to the fact that dolphins live in water but breathe air.

When we speak or sing, we have to exhale air for the voice to sound. Air, passing through the narrow fissure in the larynx formed by the vocal cords, causes them to vibrate and thereby generates sound waves. We do not begrudge the air that is thus exhaled; upon exhaling air when uttering some phrase, we can immediately inhale it again. But for dolphins the situation is different. After inhaling air, like a diver, it has to go underwater for a considerable time, and for this reason it must be very thrifty with the supply of air in its lungs. It would be too wasteful to spend this supply on generation of sounds.

The arrangement of the dolphin's respiratory tract is such that this problem can be overcome. The dolphin has several special cavities, the so-called air sacs, which communicate with the external respiratory tract and for this reason are always filled with air. The dolphin can transfer air from one sac to another, and the stream of moving air generates all the necessary sounds. This does not involve any expenditure of the air supply: as it travels from one sac to another, the air can be used many times. This is how the entire range of dolphin sounds is emitted, both communicative sounds and ranging ones (Figure 7).

This does not exhaust the "tricks" that a dolphin uses in emitting sounds. It can not only emit loud sounds without expending previous air, but send these sounds in a very definite direction, gathering all the sonic energy into a narrow, compact beam. This is also necessary for better operation of the dolphin's sonar. If the sound is emitted in the form of a narrow beam, rather than in all directions, in the first place it is possible to determine more accurately where the object detected by the sonar is located and, in the second place, the sonar acquires a longer range: in a concentrated

sonic beam, the volume of the sound is much higher and, consequently, the echo of such a powerful sound can be heard from a longer distance.

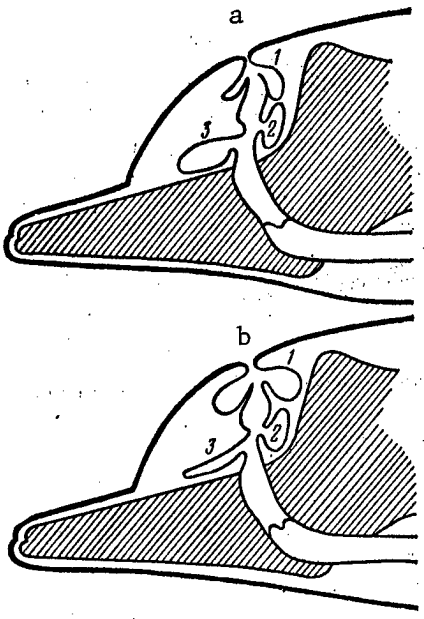

Figure 7.
There are three pairs of air sacs connected to the upper respiratory tract of the dolphin: tubular 1, vestibular 2 and premaxillary 3. Air can be blown from some sacs to others, and this is associated with a corresponding change in size of the sacs (a and b); sound is generated as air flows from sac to sac

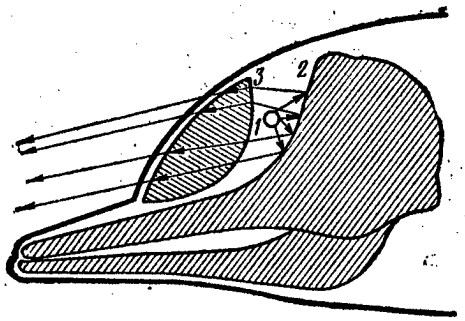

Figure 8.
The sound emitted by the source in the upper respiratory tract 1 of the dolphin is reflected by the concave frontal surface of the skull 2 and then additionally focused by the lens, the melon [or frontal pad] 3; as a result, sound is gathered into a narrow directional beam

There are two ways of obtaining a focused beam: either focus the beam by means of a concave reflector-mirror, or to do the same with a lens. One can use both a mirror and lens at the same time. This is what the dolphin does to focus the ranging sounds it emits into a narrow beam. The sound is reflected from the boundaries that separate materials with different acoustical properties, and such boundary surfaces can be used as acoustic mirrors. By changing from one medium to another with different acoustical properties, sound is refracted, it changes the direction in which it spreads, and such refraction of sound waves can be used to create an acoustical lens. The focusing system of the dolphin's echolocating device contains both a mirror and a lens. The frontal bones of the dolphin skull serve as a mirror; the air sacs, in which sounds arise, are situated expressly in front of these bones, which direct sound forward, as they reflect it. There, in the way of the sonic wave is an acoustical lens, a very special part of the body, which exists only in cetaceans, the so-called melon (Figure 8). This is an oval structure, resembling an elongated cantaloupe, which consists of resilient, fat-like tissue hanging over the dolphin's upper jaw. Thanks to its convex, oval shape, the melon gathers, focuses sound generated by the air sacs and reflected forward by the frontal bones (just like a convex glass lens focuses light beams). As a result, the echolocating sounds are emitted by the dolphin in the form of a focused beam directed forward; a real sound projector is

formed. And we have already discussed what happens when this beam encounters any object.

Without fear of exaggerating, it can be stated that the dolphin's acoustic locator is one of the most outstanding creations of nature. Thanks to it, a world that is unknown and incomprehensible to us is open to dolphins: the world of sounds, where each object has its own voice, its own acoustic image.

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CSO: 1840/088

MEDICINE

STATE OF CARDIAC HEALTH CARE IN UZBEKISTAN

Tashkent PRAVDA VOSTOKA in Russian 2 Sep 83 p 3

[Article by Professor R. Katsenovich, chairman of the board, Republic Scientific-Medical Society of Cardiologists; director, Scientific-Research Cardiology Institute, Uzbek SSR Ministry of Health; corresponding member, UzSSR Academy of Sciences: "Take Care of Your Heart"]

[Text] The widespread occurrence of diseases of the cardiovascular system throughout the world has determined the tasks in combatting this illness. In our country, a complex of measures has been provided which is directed toward developing problems of prophylaxis, early diagnosis, effective treatment and rehabilitation of persons suffering from hypertension and ischemic heart disease.

The Scientific-Research Cardiology Institute created in 1976 in the republic has become the methodological center in combatting cardiovascular diseases. The problems of cardiology are being worked out at all the medical VUZes in Uzbekistan and at a number of scientific-research institutes -- at the Cardiology, Resort and Physical Therapy Institute imeni Semashko, through work fitness examinations, at the institutes of the UzSSR Academy of Sciences, and others.

Cardiological dispensaries have been created in Kashkadarya, Samarkand, Bukhara, Syrdarinsk and Andizhan Oblasts. There are 190 cardiology offices, 146 functional diagnosis offices, and over 520 electrocardiograph offices at the polyclinics.

Uzbekistan scientists are pursuing the scientific development of problems in cardiology in several directions. They are determining the extent of cardiovascular system diseases, primarily hypertension and ischemic heart disease. They are studying the peculiarities of their occurrence, the role of various risk factors, the clinical manifestations of the diseases and their early diagnosis. They are developing methods of treating the illnesses using local medicinal flora, medicines created in Uzbekistan, as well as local health resort resources, seeking means of preventing the illnesses, and conducting other research.

The scientists of the republic are working along a single program with the All-Union Scientific Cardiology Center which coordinates research in the USSR, including the development of basic state national economic programs on public

health as well as the program of the CEMA member states on juvenile hypertension.

Modern medicine has at its disposal a broad arsenal of means for treating cardiovascular diseases. Scientists are working on creating new medicinal substances for combatting arhythmia, arterial hypertension, ischemic heart disease, and circulatory insufficiency. The specifics of their application are being studied under clinical conditions. They are creating new methods of diagnosing illnesses using pharmacological tests and applying new methods of effective treatment, including angio- and cardiac surgery.

A modern method of patient examination is being introduced in the republic. A long-distance diagnostic service has been created at the Scientific-Research Cardiology Institute, the republic hospital in the Karakalpak ASSR, and at the Tashkent First Aid Station Substation No 7. Today in Tashkent, for example, first aid substations can receive electrocardiograph readings by telephone from first aid physicians and medicosanitary units and give their recommendations. In the next few years such centers will be created in all the oblasts.

Nevertheless, the main point in effectively combatting cardiovascular disease is prophylaxis, the active sanitary-hygienic training for development and formulation of a healthy lifestyle. "Prevention of illnesses deserves particular attention, and one of the means for achieving this is the introduction of annual dispensarization [check-ups] for the entire population," said Comrade Yu. V. Andropov at the June Plenum of the CPSU Central Committee. "After all, we are speaking of the health of the people, a matter of supreme importance in the social as well as in the economic plan."

For purposes of prophylaxis, great attention is given to physical culture, therapeutic physical culture, good nutrition, physical therapy and health resort treatment methods and rehabilitation. The first positive results of ischemic heart disease and hypertension prevention were obtained in Tashkent polyclinics Nos 26 and 33. The prophylaxis of hypertension among adolescents was also quite successful. Prophylactic sectors and departments are being created in Polyclinic No 14 and the Glavtashkentstroy [Main Administration for Construction in Tashkent City] medical unit in Tashkent, as well as in Buka, Yangiyul, and Chirchik.

The republic's scientists are widely disseminating their research at intra-union and international congresses, meetings, conferences, and symposia. Uzbekistan cardiologists participated in the 8th and 9th Congresses of Cardiologists and at the 3rd All-Union Meeting of Cardiologists.

The first republic cardiologists' congress will be devoted to the basic problems of prevention, diagnosis and treatment of ischemic heart disease and hypertension. It will serve the further development of public health and medical science.

12322
CSO: 1840/090

SOURCE OF HYPERTENSION DISCOVERED

Moscow SOVETSKAYA ROSSIYA in Russian 23 Sep 83 p 6

[Article by G. Sidorova: "Hypertension: Where is the Beginning?"]

[Text] On 21 September at the USSR State Committee on Inventions and Discoveries a scientific discovery in the field of medicine was registered -- "The Phenomenon of Widespread Disruption in Cation Transport in the Cell Plasmatic Membrane with Primary Arterial Hypertension".

One of the serious and very complex problems of modern medicine is the clarification of the nature of hypertension illness. In a number of industrially developed countries, it occurs in one out of every five urban dwellers over the age of 40. The most common cardiovascular diseases are formulated on a background of hypertension. Several decades of intensive study of this illness have enabled us to learn much about its nature. For example, scientists have clarified the effect of long-term nervous-psychical tension on the development of the illness. However, the "nervous factor" nevertheless turned out not to be the decisive one, as well as the disruption in the functions of the physiological mechanisms responsible for maintaining a constant level of arterial pressure.

Thanks to this discovery it is now clear. The sources of hypertension illness go back to deep-seated changes in the tissues of the human body. Doctor of Medical Sciences Professor Yu. V. Postnov, Doctor of Biological Sciences S. N. Orlov, and a group of colleagues from the Central Scientific-Research Laboratory of the USSR Ministry of Health found damage in the cell membranes of hypertension patients (the membranes regulate the concentration of salts, sugars, amino acids and other metabolic products in the cells). They clarified the essence of this damage and its role in the inception of hypertension.

Long-term and comprehensive research allowed them to conclude that the changes discovered in the membranes and the disruption in the calcium balance within the blood cells which these changes cause are the initial link in a complex chain of changes which lead to a stable increase in arterial pressure.

The work of the Soviet scientists radically changes the present concept of hypertonic illness and opens the possibility of seeking principally new medicinal

means and developing methods of radical treatment of this illness. Moreover, the discovery of the membrane disruptions in blood cells is already finding application in a diagnostic test which makes it possible to distinguish hypertonic illness from states in which the increase in arterial pressure is merely a symptom of other illnesses. This same test will be used for determining predisposition to hypertension.

The discovery of Soviet scientists has evoked much interest abroad. The research begun in the Soviet Union on the study of the role of membrane disruptions in hypertensive illness has been repeated in a number of laboratories in France, the USA, and Japan.

12322
CSO: 1840/090

UDC 612.833.81

PLASTICITY OF ELECTRICALLY STIMULATED NEURON MEMBRANE: POSSIBLE ROLE OF CALCIUM IONS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 271, No 5, Aug 83
(manuscript received 13 Apr 83) pp 1261-1265

D'YAKONOVA, T. L. and TURPAYEV, T. M., corresponding member, USSR Academy of Sciences, Institute of Developmental Biology imeni N. K. Kol'tsov, USSR Academy of Sciences, Moscow

[Abstract] Plasticity of nerve electrical function has been studied most closely in synaptic transfer. Fluctuations in calcium-ion content has been observed in such studies both within and outside the neuron, which could alter cell stimulation. The present study considers the role of calcium ions in developing acclimatization of an electrically-stimulated membrane of Helix pomatia, stimulated with electric impulses. Results showed that entry of calcium ions into the cell governed variations in electrical responses. The study included examination of the acclimatization effect, elimination of acclimatization via blocking the Ca channels with Cd, Mn or Co ions, or by replacing Ca ions with Mg ions, and developing acclimatization with a Ca ionophore. Effects of sodium fluoride and blockage through reduced Ca ions were also examined. Results confirmed that calcium content of cells was an important factor in stimulation levels of the neurons studied, and it determined plastic properties of the electrically stimulated membrane in the test mollusks. Figures 4; references 15: 8 Russian, 7 Western.
[059-12131]

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DEPENDENCE OF FUNCTIONAL HEART ACTIVITY ON MENTAL ACTIVITY

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KRUSHINSKIY, L. V., corresponding member, USSR Academy of Sciences, KUZNETSOVA, L. M., YAKIMENKO, O. O. and POPOVA, N. P., Moscow State University imeni M. V. Lomonosov; Moscow State Pedagogical Institute imeni V. I. Lenin

[Abstract] The present study considered features of heart functions among two groups of subjects, one of which successfully solved given logical problems

while the other did not. The test involved determining a vector and extrapolating its direction and rate of motion. A hidden goal was to determine the pattern of the experiment relative to a series of cylinders. ECG readings were taken at rest, during mental work, during a control physical load, during a cold shock and 3 minutes after completing the process. The 130 subjects, from 20 to 50, were divided into pairs and asked alternately to solve the task and to rest. Results showed that most subjects experienced accelerated heart beats during the mental activity. Individuals with varying logical aptitude had various heart functions, with successful solution of the task being accompanied by increased heart beat, followed by relaxation; less intensive changes in heart functions were observed where the problem was not solved. Figures 3; references 5: 4 Russian, 1 Western.
[059-12131]

MICROBIOLOGY

UDC: 577.486:(576.8.093+517.93)

THEORETICAL AND EXPERIMENTAL ANALYSIS OF TURNOVER OF MATTER IN A CLOSED MICROECOSYSTEM. 3. EXAMPLE OF EXPERIMENTAL CLOSED ECOSYSTEM OF UNICELLULAR ORGANISMS THAT IS LIMITED BY CARBON OR NITROGEN

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR. SERIYA BIOLOGICHESKIKH NAUK in Russian No 5, Vyp 1, Apr 83 (manuscript received 16 Nov 81) pp 56-64

[Article by G. N. Fishteyn, B. G. Kovrov, V. G. Gubanov and N. S. Abrosov, Institute of Physics imeni L. V. Kirenskiy, Siberian Department of USSR Academy of Sciences, Krasnoyarsk]

[Text] In the first part of our study [1], a mathematical model was constructed of a homogeneous closed microecosystem (CMES) consisting of autotrophic organisms--producers (X) and heterotrophic organisms--reducers (R), which break down dead organic matter (Z) into simple mineral compounds. The turnover rates are determined by the intensity of biological processes on both trophic levels. It is assumed that biomass increment on the first trophic level can be limited by one of the m biogenic elements (S_j, $j = \overline{1, m}$) or carbon dioxide (W), or else by the energy of light (E), while the rate of breakdown of dead organic matter by reducers is determined by its amount or oxygen.

As shown by analysis of the model [2], in a homogeneous closed ecosystem (CES) "producer-reducer" stable steady states occur only in 3+m (out of 6×(3+m) possible) regions of function, which differ in nature of limitation of biological processes. The distribution of limiting factors and expression of some steady state or other (and functioning mode in general) depend on the ratios between the initial characteristics of the CES: overall quantities of substances suitable for biosynthesis (carbon--M_C, oxygen--M_O, hydrogen--M_N, biogenic elements--M_j) and available energy (E), which are the parameters of ecosystem control. For example, low illumination ($E<E_x$) or low overall concentrations of elements in the system ($M_C<M_{Cx}$ or $M_j<M_{jx}$, etc.) lead to death of the system.

The biomass of organisms (X, R), which also means biomass of the system (B = X + R) are proportionate (linearly or in a ratio (7) see [2]) to change in overall magnitude of the factor that limits the function of the first trophic level. There is analogous change in concentration of organic matter in the system (OM = B + Z), but it is independent of the value of the factor limiting the function of autotrophs (of illumination) only in the area of

growth limitation of reducers by oxygen (maximum respiration). In the same region, with increase in overall concentration of carbon (M_C) or oxygen (M_O), there is no change in system biomass, but OM increases linearly or decreases, respectively.

Thanks to the development method of closed microecosystems (MES) [3-5], one can check experimentally on a concrete microbial ecosystem the obtained restrictions on control parameters leading to some possible variant of distribution of limiting factors over trophic levels. This, in turn, helps further develop the method and coordination of theoretical and experimental studies of the function of microbial ecosystems.

We selected one of the systems proposed in [3-5] for experimental testing; it contained one species of unicellular green algae, Chlorella 21901, and two species of reducer systems, Pseudomonas sp. and Mycobacterium rubrum, which are viewed, from the functional point of view, as a single general unit with certain integral characteristics.

We planned the following for our experiment: a) realization of steady states of MES in which the function of the biocenosis would be limited by the amount of carbon or nitrogen; b) investigation of MES state (species composition, number of organism of each species, mass characteristics, limiting factor, etc.) as a function of magnitude of limiting factor; c) realization of regions of death (number of organisms of all species or number of organisms on one of the trophic levels equals zero) due to shortage of carbon or nitrogen.

We took the coefficients for calculation of regions of limited function of MES by carbon or nitrogen and the possible steady states from literature sources and results of analysis of stationary states of experimental MES [3-5] so as to render the model more adequate (in a stationary state) for stable experimental systems and, in particular, the chosen MES.

For the MES we used a medium similar to the one used in the experiments described in [3-5], which were converted using formulas (10) and Table 4 (see [2]) so as to have the ecomaximum amount of P, S and other elements in the MES in relation to amounts of C and N: $MgSO_4 \cdot 7H_2O$ = 0.5 g/ℓ, KH_2PO_4 = 0.07 g/ℓ, (Tamiyya)'s trace elements 2.5 mℓ/ℓ and Trilon B = 0.035 g/ℓ. We added $C_6H_{12}O_6$ and NH_4NO_3 to the medium in amounts, which we varied, that provided (according to estimates) restriction of organism growth by nitrogen or carbon.

The MES were prepared by the following method: 100 mℓ suspension with a concentration of 10^5-10^7 cells/mℓ from mother MES was transferred into 900 mℓ of the above-described medium. The obtained suspension was decanted into 50 mℓ tubes, 5 mℓ in each (with 5 tubes for each variant), which were then sealed. The quantity of suspension was determined by the possibility of complete oxidation of added organic matter in the MES by the existing oxygen. In such a situation, the oxygen does not become a limiting factor (at least not in a stationary state). The tubes were placed in a "luminostat" [illumination chamber?] where illumination of 3000-4000 lux and $t°$ = 28±4°C were maintained around the clock.

We assessed progress in development of the systems by the change in concentration of biomass and chlorophyll, by measuring light scatter by biomass at a wavelength of 740 nm and light absorption by chlorophyll in the wavelength range of 660-700 nm. For this purpose, there were special trays (1.8 cm in thickness, and illumination assured absence of photic limitation in stationary state) in the bottom part of the tubes. The readings were taken using an SF-18 spectrophotometer, without unsealing the tubes. The readings were converted into units of concentration of undissolved organic matter (UOM) using a calibration scale.

The quantitative and qualitative composition of the biocenosis was checked by plating the MES suspension on solid agarized Gromov medium [6] by the method of serial dilutions. For this purpose, the tubes were opened, 1 mℓ suspension taken and used to prepare several dilutions in sterile tap water (10, 10^2, 10^3, and 10^4-fold dilutions). Since we knew from experiments with analogous MES [1, 2] that M. rubrum is present in low concentration in the system (see Tables 1 and 2), we also used suspension without dilution to lower the margin of error. The cultures were made by transferring 0.1 mℓ suspension to the surface of the medium and triturating it with a spatula. Cultures were plated in three Petri dishes for each dilution. The closed dishes were incubated at $t°$ = 29±2°C for 5-7 days. Finally, we opened three test tubes in each variant.

To determine the nature of limitation of biocenosis function (by carbon or nitrogen) we determined whether NH_4^+ (Nessler's test) and NO_2^-, NO_3^- (Griess test) were present in the MES suspension. We also measured pH using a pH-340 instrument.

Calculation was made of the area of MES death due to insufficient carbon or nitrogen, the area in which system function in a stationary state would be limited by carbon and region limited by nitrogen, i.e., the region in which carbon is no longer a limiting factor.

Estimates revealed that M_{Cx} = 0.325 mg/mℓ and M_{Nx} = 0.079 mg/mℓ. Let us recall that M_{Cx} (M_{Nx}) is the overall concentration of carbon (nitrogen) in a CMES below which prolonged turnover of substances is impossible in the system, the system perishes (X = 0, R = 0). Thus, theoretically, development of an MES should end with death with $M_C < M_{Cx}$ = 0.325 mg/mℓ or $M_N < M_{Nx}$ = 0.078 mg/mℓ. With the appropriate amount of nitrogen (M_N = 0.15 mg/mℓ) for $0.325 < M_C <$ 0.625 mg/mℓ, function of the MES biocenosis in a steady state should be limited by carbon and with $M_C > 0.625$ mg/mℓ by nitrogen. The conditions of limitation of MES biocenosis by nitrogen with the appropriate amount of carbon (M_C = 0.625 mg/mℓ) should also exist with $0.078 < M_N < 0.15$ mg/mℓ, and with $M_N > 0.15$ mg/mℓ there should be limitation by carbon.

The overall concentrations of carbon (M_C) and nitrogen (M_N) in the MES are listed in Tables 1 and 2. There too, the results of analyzing the systems 1 year after they were sealed are listed. The data on assays of biomass, chlorophyll and concentration of cells in MES obtained during the experiment revealed that, by this time, all of the systems were at least in a quasistationary state. Figures 1 and 2 illustrate examples of dynamics of UOM for MES C1, C4, C6 and N1, N4, N8. All of the statistical calculations were made for a confidence probability of 0.9 [7, 8].

Table 1. Results of analysis of stationary states of MES with different carbon levels

MES	M_C	M_N	OM	UOM $\pm J_{0,9}$	pH	NO_2^-, NO_3^-	NH_4^+	Number of cells $\pm J_{0,9}$ (in 10^5 cells/mℓ)		
	mg/ℓ							*Chlorella*	*Pseudom. sp.*	*M. rubrum*
C1	0,10	0,15	0,2	0,12±0,008	7,7—805	++	++	1,22±0,15	1,24±0,22	0,004±0,0028
C2	0,15	0,15	0,3	0,22±0,035	7,6—7,82	++	++	1,62±0,24	1,68±0,23	0
C3	0,25	0,15	0,5	0,40±0,043	6,65—7,6	++	++	2,0±0,33	2,5±0,47	0
C4	0,35	0,15	0,7	0,45±0,043	6,2—7,07	++	+	2,0±0,58	4,0±0,72	0
C5	0,40	0,15	0,8	0,60±0,067	6,85—6,95	+	+	2,08±0,34	5,2±1,07	0
C6	0,45	0,15	0,9	0,72±0,038	7,0—7,38	+	+	2,6±0,62	3,6±0,51	0
C7	0,50	0,15	1,0	0,87±0,043	7,13—7,5	+	+	3,5±0,61	6,6±1,35	0
C8	0,55	0,15	1,10	0,83±0,017	6,71—7,58	—	+	3,3±0,65	4,8±0,92	0
C9	0,60	0,15	1,20	0,91±0,027	7,23—7,35	—	+	3,9±0,70	5,3±0,73	0
C10	0,65	0,15	1,25	0,94±0,018	6,7—7,4	—	+	5,8±1,94	5,2±0,98	0
C11	0,85	0,15	1,25	0,96±0,102	6,63—7,05	±	—	5,1±0,78	5,9±0,69	0
C12	1,05	0,15	1,25	0,97—0,025	8,2—8,31	—	±	5,3±0,46	8,2±0,56	0
C13	1,25	0,15	1,25	1,0±0,046	7,27—7,87	—	—	2,8±2,34	6,8±1,74	0

Note: $J_{0.9}$ is the confidence interval for confidence probability of 0.9. The range of pH changes is shown for three replicas (three tubes with MES); +(-) shows presence (absence) of ion.

Table 2. Results of analysis of stationary states of MES with different nitrogen levels

MES	M_C	M_N	OM	UOM $\pm J_{0,9}$	pH	NO_2^-, NO_3^-	NH_4^+	Number of cells $\pm J_{0,9}$ (in 10^5 cells/mℓ)		
	mg/mℓ							*Chlorella*	*Pseudom. sp.*	*M. rubrum*
N1	0,625	0,019	0,156	0,38±0,06	7,4—6,8	—	—	0,145±0,063	4,89±0,94	0,37±0,092
N2	0,625	0,028	0,229	0,52±0,028	7,26—6,85	—	—	0,72±0,20	8,17±1,28	0,58±0,13
N3	0,625	0,045	0,375	0,71±0,073	7,25—7,05	—	—	10,4±1,80	19,2±4,65	1,15±0,38
N4	0,625	0,054	0,448	0,80±0,051	7,66—7,55	—	—	10,3±2,19	7,03±1,55	1,6±0,82
N5	0,625	0,063	0,52	0,90±0,07	7,7—6,58	—	—	21,5±3,60	5,98±1,40	0,37±0,078
N6	0,625	0,08	0,667	0,93±0,012	8,15—7,9	—	±	2,86±0,76	3,2±0,8	0,11±0,053
N7	0,625	0,098	0,812	0,89±0,052	8,2—7,11	+	+	5,34±2,10	2,7±1,10	0,045±0,043
N8	0,625	0,115	0,958	0,88±0,064	8,03—7,88	+	+	4,5±2,08	7,05±2,37	0,011±0,01
N9	0,625	0,133	1,014	0,82±0,108	7,8—7,08	+	+	2,3±0,34	3,6±1,00	0
N10	0,625	0,176	1,25	0,90±0,088	7,6—6,3	+	±	4,1±0,72	4,5±0,96	0
N11	0,625	0,194	1,25	0,87±0,048	7,5—7,0	+	+	3,44+0,76	3,79±0,61	0
N12	0,625	0,211	1,25	0,83±0,093	7,5—7,07	+	+	1,6±0,64	4,38±4,00	0

Note: Designations are the same as in Table 1.

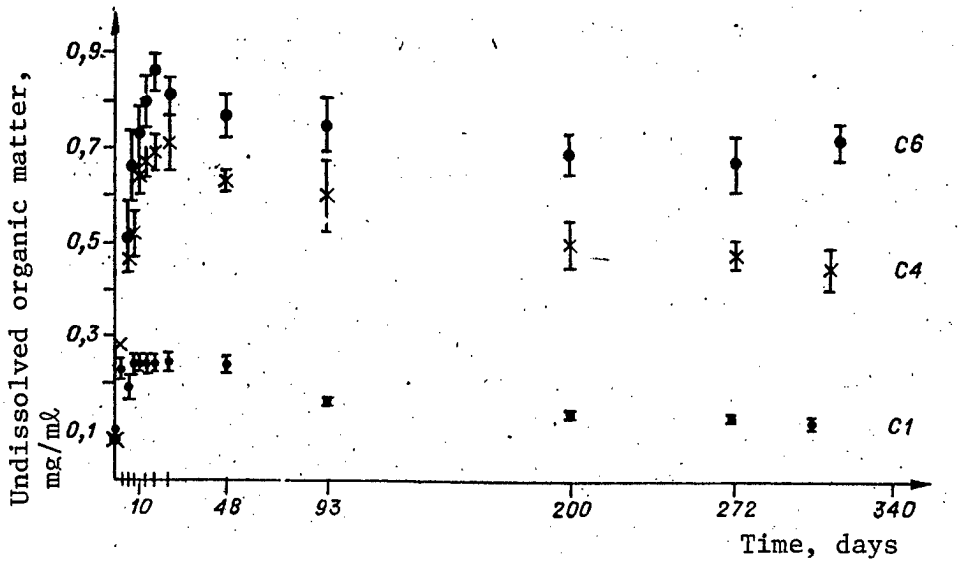

Figure 1. Dynamics of undissolved organic matter (UOM) for some MES (C1+C4, C6) with different carbon (M_C) levels

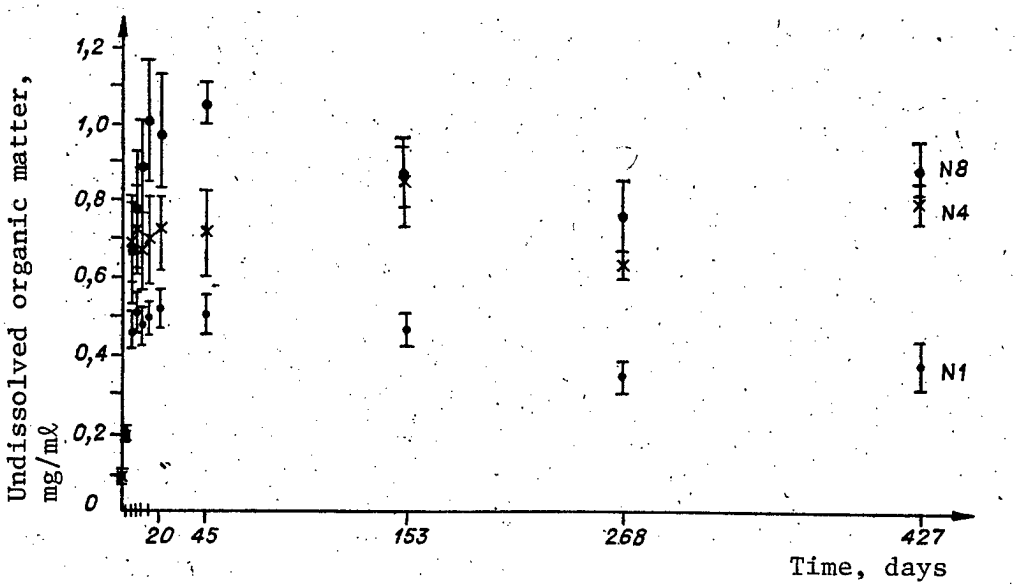

Figure 2. Dynamics of undissolved organic matter (UOM) for some MES (N1, N4, N8) with different nitrogen (M_N) levels

Analysis for assay of mineral forms of nitrogen in the medium confirmed that the realized states conform (at least qualitatively) to those calculated on the basis of the proposed mathematical model. Thus, in the region where nitrogen was assumed to be the limiting factor, the presence of nitrites, nitrates and ammonia group was not demonstrated, whereas in the region of limitation of the biocenosis by carbon, they were demonstrated (see Tables 1

and 2). This warrants our conclusion that calculation was correct for the regions of carbon or nitrogen limitation of system function, since the other elements (P, S, K, Mg, etc.) were used in amounts known to be excessive (more than the estimated quantities by a factor of $10-10^2$).

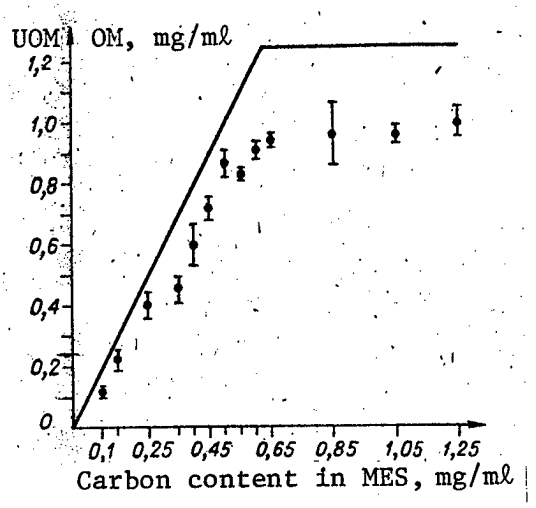

Figure 3.
Theoretically calculated distribution of organic matter (OM--solid line) and experimentally obtained distribution of undissolved organic matter (UOM) in systems as a function of their carbon (M_C) content

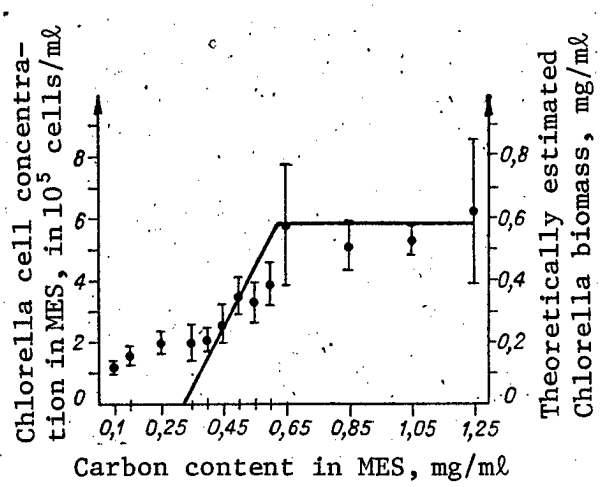

Figure 4.
Theoretically calculated distribution of producer biomass (solid line) and experimentally obtained distribution of Chlorella cell concentration for systems with different carbon (M_C) content

Figure 3 illustrates the quantity of undissolved organic matter in MES as a function of quantity of carbon (M_C in mg/mℓ) added to the system. It also shows that this experimental function is consistent with the theoretically calculated change in quantity of organic matter. Apparently, the difference between values for OM and UOM represents the amount of dissolved organic matter (DOM) in the MES, whereas UOM is the sum of biomass and detritus. Thus, one can judge (with some degree of accuracy) the actual quantities of UOM in MES as a function of quantity of limiting factor (in this case, carbon) from the corresponding theoretical function for OM.

Figure 4 illustrates the distribution of Chlorella cells in experimental MES and theoretical distribution of their biomass with change in carbon (M_C) concentration in the system. If we assume that the distribution of Chlorella cells by mass is governed by the normal law and that the average cell has a mass δ, Figure 4 gives us some idea, with accuracy to the factor δ ($\delta = 1$), about the distribution in experimental systems of Chlorella biomass when M_C changes. In this case, there was purely qualitative consistency between theoretical (for the selected coefficients) and experimental data.

The quantity of UOM in MES as a function of overall concentration of nitrogen (M_N) is illustrated in Figure 5. We see that, in the first phase of the

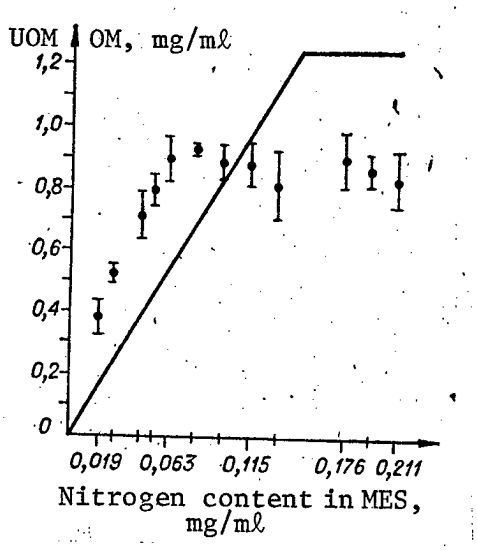

Figure 5. Theoretically calculated distribution of organic matter (OM)--solid line) and experimental distribution of undissolved organic matter (UOM) in systems as a function of amounts of nitrogen (M_N) they contain

curve of UOM distribution (to system N7), the concentration of UOM is higher in experimental MES than the theoretically calculated OM. The excessive increment of organic matter, in relation to the expected level, is apparently related to synthesis of more fats and carbohydrates on a medium rich in carbon but with a shortage of nitrogen. Further (after N8), the concentration of UOM is lower than the corresponding value for OM. Here, as was the case above, the difference between OM and UOM can be considered as DOM.

Thus, on the basis of the proposed mathematical model of a homogeneous CMES, the above-described experiment was planned and performed by the method of closed MES. In this state, MES obtained in the experiment fell into the calculated regions of corresponding limiting factors (C or N) with a good degree of accuracy, as confirmed by qualitative analysis for demonstration of NH_4^+, NO_2^- and NO_3^- ions, nature of distribution of Chlorella and UOM in the systems as a function of limiting factor. Elimination of the elements in the system (M. rubrum) could be attributed to the fact that, with increase in volume of food resources (in this case, increase in carbon content of MES in the form of $C_6H_{12}O_6$ and nitrogen content in the form of NH_4NO_3), antagonistic relations (which were not considered in the model) capable of leading to ejection of some species emerge to the fore in development of the system [9]. This is confirmed by the fact that, at low levels of the limiting factor (in this case for systems C1 and N1-N8), all species are preserved. Since the model was essentially correct in predicting the possible outcome of development of the system, the absence of regions of death, elimination of one of the elements, as well as the fact that distinct coincidence of quantitative model and experimental results was not always obtained, do not disappoint us, but merely suggest future directions of work on the model. Thus, if (instead of the values used here for coefficients $\alpha_C = 0.5$ and $\alpha_N = 0.12$) we state that $\alpha_C = 0.65$ and $\alpha_N = 0.07$ (let us recall that α_K is the relative amount of the Kth element in the biomass of organisms, α_K = const), the corrected theoretical distribution of OM in the systems as a function of limiting factor yields good quantitative agreement (according to the χ^2 criterion [8]) with experimental data. With increase in specific rate of uptake by reducers of dead organic matter, there is a decline of the bottom range (M_{CX}, M_{NX}, etc.) of existence of the system, which could be attributed to the absence of regions of destruction. However, the large quantity of independent coefficients causes some arbitrariness in their choice, which predetermines the same outcome with different values for the same coefficients. On the other hand, some experimental data [5] are indicative of a considerable amount of DOM in MES, which is not

considered in the model. Moreover, the relative amount of elements in organisms (α_K) is not constant (as is the case in the model), but depends appreciably on living conditions, as confirmed in Figure 5.

However, the proposed model, in the form we have described, can serve as a useful (if not mandatory) tool for development of real closed microecosystems capable of long-term maintenance of turnover of substances with a given distribution of limiting factors. Such microecosystems can be used to solve some problems of both general (strategy of development, questions of degree to which they are closed and rates of circulation of substances, etc.) and microbial ecology (role of different species of microorganisms in the circulation of substances, questions of interaction, etc.).

Further correction of the model, coefficients and experiment is required to investigate the finer properties of ecosystem function.

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UDC 578.835

CALICIVIRUSES

Moscow VOPROSY VIRUSOLOGII in Russian No 3, May-Jun 83

[Unsigned article under heading "Editorial Note"]

[Text] In August, 1981 the International Committee on the Taxonomy of Viruses decided to segregate caliciviruses as a separate family, Caliciviridae (Matthews, 1981). They were previously regarded as the genus Calicivirus in the family Picornaviridae. This segregation was based on the structural-morphological features of the calicivirus virions and the cardinal differences in the genome strategy between them and picornaviruses. Calicivirus virions are characterized under negative-contrast electron microscopy by deep (about 10 nm) cup-shaped surface impressions which are easily visible along the perimeter of the virion and in its center, which fact is reflected in their name (Greek "calyx" or Latin "calix"--"cup"). The virions of picornaviruses appear under analogous conditions as spherical. The dimensions of caliciviruses (particle diameter 32-40 nm, average 37 nm) are greater than those of picornaviruses (22-30 nm) and have a large mass of virions (14×10^6 -16×10^6 daltons in caliciviruses; 8×10^6 -9×10^6 daltons in picornaviruses). The structural protein of caliciviruses is one form of a large polypeptide (71×10^3 daltons), while picornavirus particles contain four structural proteins (three with a molecular mass of 24×10^3 -41×10^3 daltons, one with a molecular mass of 5.5×10^6 -13.5×10^6 daltons). In genome strategy also caliciviruses differ from picornaviruses. In cells infected with caliciviruses, large polypeptides which could be regarded as precursors of structural and nonstructural polypeptides of a virion are not observed. The largest polypeptide present in cells during multiplication of calicivirus corresponds in molecular mass to the structural polypeptide of calicivirus capsid (Black and Brown, 1976). In picornavirus infection a large polyprotein forms in the cells which is subject to posttranslational fission with formation of structural and nonstructural virion polypeptides. The synthesis of picornavirus polyprotein is coded of the genome RNA which plays an informational role. The genome RNA of caliciviruses is informational for the synthesis of nonstructural polypeptides, while the synthesis of structural (capside) polypeptide is coded by subgenome RNA (Black and Brown, 1978; Schaffer, 1980).

The caliciviruses known at present are divided into the following groups: 1) pig calicivirus (PoCV-porcine calicivirus); 2) pinniped calicivirus (PiCV-pinniped calicivirus); and 3) cat calicivirus (FCV-feline calicivirus)

(Studdert, 1978). It is expedient to add human caliciviruses (HCV-human calicivirus) to these groups, since in recent years data has appeared indicating an etiological role for caliciviruses in acute nonbacterial gastroenteritis in humans.

In 1976, Madeley and Cosgrove were the first to detect particles indistinguishable from calicivirus in the feces of children suffering from acute nonbacterial gastroenteritis. Analogous particles were then discovered by Flewett and Davies (1976). The relative infrequency of the detection of calicivirus-like particles in feces in cases of nonbacterial gastroenteritis gave rise to doubt both as to the actual existence of human caliciviruses and as to their etiological role in acute gastroenteritis. Schaffer (1979) expressed the hypothesis that particles taken to be calicivirus in fecal preparations were in fact astrovirus, which are also detected in children suffering from acute gastroenteritis (Madeley and Cosgrove, 1975). The dimensions of astrovirus are close to those of calicivirus, and the star-shaped form of the particles from which they were named (from the Greek "astron"--"star") is also characteristic of calicivirus at a particular spatial orientation. In 1979, however, Madeley convincingly demonstrated the possibility of precise electron-microscopic differentiation between these two viruses.

In recent years a number of reports have appeared regarding the detection of calicivirus in the feces of children of various ages and of adults with symptoms of acute gastroenteritis. Particles having the dimensions and morphology of calicivirus were detected in illnesses of infants and preschool children by Kjeldsberg (1977), Spartt and coauthors (1978), Cubitt and coauthors (1979), Chilba and coauthors (1979, 1980) and Suzuki and coauthors (1979). Analogous viruses have been detected also in the investigation of outbreaks of acute gastroenteritis among school-children (McSwiggan and coauthors, 1978; Cubitt and coauthors, 1979; Oishi and coauthors, 1980). Oishi and coauthors also reported that cases of acute gastroenteritis had been observed among adults in the environment of the ill school-children, and Cubitt and coauthors (1981) described an outbreak of calicivirus gastroenteritis in a home for the elderly. A number of authors have carried out immunoelectron-microscopic investigations which have lent support to the identification of calicivirus detected in feces as the etiological agent in cases of acute gastroenteritis (Chiba and coauthors, 1979; Cubitt and coauthors, 1979; Oishi and coauthors, 1980 et al.).

The wide occurrence of calicivirus in human collectives is attested by Sakuma and coauthors (1979) in Sapporo, Japan, who detected antibodies to human calicivirus in 23% of children younger than 5 months, 30% aged from 6 to 23 months, 66% aged from 2 to 5 years, and 90% of school-age children and adults.

In connection with the accumulated data indicating the etiological role of calicivirus in acute diarrheas, it is appropriate to note Woode and Bridger's 1978 report of the detection, in the feces of calves ill with diarrhea, of virus particles similar to calicivirus in dimensions and form. Filtrate of the feces of these calves caused diarrhea in calf-gnotobionts when administered orally.

The small number of reports of calicivirus gastroenteritis in humans as compared to the number of reports of acute intestinal illness caused by rotavirus supports the assumption formulated above to the effect that rotavirus is the basic cause of acute nonbacteriological gastroenteritides. The capacity of calicivirus as well as certain other virus agents (the Norwalk virus and similar viruses, astrovirus, adenovirus) to cause acute gastroenteritis may be considered as proved, although their comparative epidemiological significance in these diseases needs further study.

Very recently as a result of epidemiological and virological studies Smith and coauthors have obtained basic data indicating that the calicivirus which causes vesicular exanthema in pigs derives from pinniped calicivirus. This in turn indicates the unusual ecological plasticity of calicivirus. Studdert (1978) points out that the ecological and epidemiological situation in which pinniped calicivirus developed the ability to cause vesicular exanthema in pigs is similar to the situation in which the Lassa and Marburg viruses cause hemorrhagic disease in humans.

A number of circumstances, which were brought to light during study of the epizootology of vesicular exanthema in pigs, gave Madin grounds (1975) to formulate the hypothesis of the derivation of this illness from a marine source. After caliciviruses (four antigenically distinct types) were isolated from pinnipeds (sea lions, seals [tyulenniy] and sea bears [kotik]) it was shown experimentally that these viruses cause an illness in young pigs which is indistinguishable from vesicular exanthema. Between 1976 and 1980 Smith and coauthors presented additional information supporting Madin's hypothesis. The spread of vesicular exanthema in pigs from the time of its detection in the US in 1932 was confined to California until 1952. The islands of the Santa Barbara channel, on one of which (San Miguel) sea-lion calicivirus was first detected, are located in close proximity to the California shore of the Pacific Ocean. In an investigation of the sera of wild pigs and piglets living on these islands 26% of the animals showed antibody to pinniped calicivirus. Wild piglets are captured by amateur hunters and instances of the removal of piglets from San Clement Island to hunting preserves in California are known. Smith and Ackers (1976) discovered that the meat of seals from the Pribylov Islands found its way to Utah in the form of frozen crude ground meat for use as feed for mink being raised there. Some of the farmers add this ground meat to pig feed. All of this supports the hypothesis that pig vesicular exanthema virus is in fact pinniped virus. Smith and coauthors consider the primary hosts of these viruses to be not pinnipeds, but more widely distributed inhabitants of the sea which are in contact with pinnipeds, fish in particular. The isolation of calicivirus from opaline-eye bass and hepatic fluke living parasitically in the sea-lion organism (Smith and coauthors, 1978 and 1980) supports this opinion. If the calicivirus which causes vesicular exanthema in pigs proves to be pinniped calicivirus (and more and more arguments support this view), then this form of vesicular exanthema will be the only instance of a complex ecological situation in which a virus of a marine ecosystem proved capable of rapidly adapting to a cardinally different land ecosystem while preserving (or even developing) pathogenic properties for mammals.

12344
CSO: 1840/139

UDC 577.1

SUPERSYNTHESIS OF DNA-POLYMERASE I AS A FUNCTION OF SPECIFIC RATE OF GROWTH OF ESCHERICHIA COLI CM 5199

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 271, No 6, Aug 83
(manuscript received 25 Jan 83) pp 1508-1511

GOLOVLEV, Ye. L., SHKIDCHENKO, A. N., SOKTOYEV, S. A. and GURINA, L. V., Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast (Presented by academician G. K. Skryabin 3 Dec 82)

[Abstract] A study of CM 5199 bacterial strain of E. coli showed that, during periodic cultivation of a lysogenic strain of E. coli CM 5199, the culture goes through the entire cycle of development from the lag-phase up to the stationary phase of growth within 15 hours. Maximal DNA-polymerase activity occurred in the phase of exponential growth but it decreased during transition of the culture into the phase of moderation of growth, indicating the direct relationship between DNA-polymerase activity and the growth rate and physiological state of the culture. This was confirmed by experiments involving continuous cultivation of the producer. It was found that DNA-polymerase synthesis at high growth rates during periodic cultivation may be limited by the state of the protein-synthesizing apparatus. This was confirmed during continuous cultivation experiments. It was found that DNA-polymerase activity in E. coli CM 5199 cells is directly related to the growth rate in the D=0.3-0.7 hr^{-1} range. A direct relationship between the growth rate and biosynthesis of an enzyme not directly connected with growth is extremely rare, especially at high growth rates. This study also revealed the reconstruction of the protein-synthesizing apparatus of E. coli at growth rates above 0.3 hr^{-1} due to the effect of some factor of metabolic limitation which acts in a periodic culture, in connection with which metabolic limitation at the level of the protein-synthesizing apparatus is not removed. Figures 3; references 10: 1 Russian, 9 Western.
[060-2791]

UDC 579.833.27.083.12

COMPARATIVE STUDIES ON VENEZUELAN EQUINE ENCEPHALOMYELITIS VIRUS VARIANTS ISOLATED FROM VARIOUS CHRONICALLY INFECTED CELLS FOLLOWING TRANSFECTION

Moscow VOPROSY VIRUSOLOGII in Russian No 3, May-Jun 83 (manuscript received 5 Nov 82) pp 306-311

TSILINSKIY, Ya. Ya., KARPOVA, Ye. F., PRYANICHNIKOVA, L. V. and TIKHONENKO, T. I., Institute of Virology imeni D. I. IVANOVSKIY, USSR Academy of Medical Sciences, Moscow

[Abstract] Studies were conducted on variants of Venezuelan Equine Encephalomyelitis (VEE) virus obtained from primary chick embryo fibroblast cultures, monkey kidney cell culture, and BHK-21 cells transfected with cellular DNA prepared from HeLa Cells infected with VEE virus. The transfected chick and monkey cells produced small-plaque viruses with a low reproduction potential, while the BHK-21 cells yielded a viral variant with a high reproductive potential producing medium-sized plaques. In addition, the viral envelope proteins of the viruses derived from the BHK-21 cells differed in electrophoretic mobility from the pattern obtained with the envelope proteins of the viruses produced by the chick and monkey cells. Infection of the monkey, chick and BHK-21 cells with VEE virus or its RNA resulted in the production of identical VEE viruses. Differences in the viral variants produced by transfection of the target cell lines with DNA derived from VEE-infected HeLa cells may have been due to contamination or admixture of double-stranded, virus-specific RNA, hybrid DNA-RNA molecules, or a DNA provirus; whether any of these hypotheses is correct remains to be seen. Figures 2; references 16: 7 Russian, 9 Western.
[138-12172]

UDC 578.24:578.833.26].086.3

ELECTRON MICROSCOPY OF PIG EMBRYO KIDNEYS CELLS INFECTED WITH TICK-BORNE ENCEPHALITIS VIRUS

Moscow VOPROSY VIRUSOLOGII in Russian No 3, May-Jun 83 (manuscript received 29 Oct 82) pp 316-321

LISAK, V. M., KOROLEV, M. B., DZHIVANYAN, T. I., ZHANKOV, A. I. and LASHKEVICH, V. A., Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow

[Abstract] Studies were conducted on the electron microscopic appearance of pig embryo kidneys cells infected with tick-borne encephalitis virus, as well as the effects of treatment with actinomycin D, cycloheximide, or hypertonic NaCl (190 mM) alone or in combination. Depending on the treatment to which the ce-ls were subjected, various structural alterations were observed which included electron-dense spherical particles the size of the virus in association with smooth, interlacing membranes believed to represent modified endoplasmic reticulum. Hypertonic NaCl potentiated the degree of such changes, while

treatment with inhibitors of macromolecular synthesis counteracted them. Although observations of this nature may eventually contribute to a better understanding of flavivirus morphogenesis, there was no marked increase in extracellular viruses following NaCl treatment or in combination with pre-treatment by inhibitors of RNA and protein synthesis. Figures 7; references 20: 5 Russian, 15 Western.
[138-12172]

UDC 616.98:578.8]-022.39-078.73

IMMUNOLOGICAL, ZOOLOGICAL AND PARASITOLOGICAL ASPECTS OF HEMORRHAGIC FEVER-RENAL SYNDROME IN AMUR REGION

Moscow VOPROSY VIRUSOLOGII in Russian No 3, May-Jun 83 (manuscript received 6 Sep 82) pp 351-355

VERETA, L. A., MZHEL'SKAYA, T. V., VORONKOVA, G. M., VOLKOV, V. I., SHCHUKIN, A. V., DOLGIKH, A. M. and KOLOMEYETS, V. I., Khabarovsk Scientific Research Institute of Epidemiology and Microbiology, RSFSR Ministry of Health

[Abstract] An epidemiologic survey was conducted on the rate of infectivity of field mice in the Amur region with the hemorrhagic fevel-renal syndrome virus in relation to season and population density of the rodents during 1980-1982. The virus circulated among the rodents on a year-round basis with peak infectivity in September. A high positive correlation prevailed between population density of the mice and the number of individuals infected, based on blood serologies and immunofluorescent examinations of the lungs. In 1981 a high correlation existed between infectivity and the presence of Gamasid mites on the mice. These observations suggest that the level of field mice infectivity with the hemorrhagic fever-renal syndrome virus is dependent on both transmissive (mouse-to-mouse) and nontransmissive (intranasal, oral) factors, with the latter factors predominating in importance. References 6: 5 Russian, 1 Western.
[138-12172]

UDC 615.371:578.82.012

COMPARISON OF LARGE-SCALE METHODS FOR CELL AND VIRUS CULTIVATION

Moscow VOPROSY VIRUSOLOGII in Russian No 4, Jul-Aug 83 (manuscript received 15 Dec 82) pp 44-49

GRACHEV, V. P., ZAVAL'NYY, M. A., POPOVA, V. D., KHANINA, M. K. and MIRONOVA, L. L., Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow

[Abstract] Comparative studies were conducted on large-scale cultivation of primary, secondary and continuous diploid and heteroploid human and animal cells, as well as tick-borne encephalitis and poliomyelitis viruses, using a

perfusion tank system with Rashig rings [Gravech, V. P. et al., Voprosy Virusologii, No 1:88-93, 1980] and a pseudosuspension culture with microcarriers [Zaval'nyy, M. A. et al., Voprosy Virusologii, No 5:583-589, 1980]. Both systems yielded considerably higher cell harvests than conventional methods. The yield of tick-borne encephalitis virus in the perfusion system was twelve-fold greater than in standard roller cultures, while the poliovirus titers obtained by conventional and large-scale methods were essentially equivalent on a per ml basis. However, because of rapid cell growth in the microcarrier system, highest PFU/cell in the case of poliovirus were obtained with this system of cultivation using primary green-monkey kidney cells. These observations indicate that generalizations as to optimum growth conditions for various cells and viruses are difficult to make, and that the conditions for large-scale cultivation of cells and viruses have to be determined individually. Figures 3; references 11: 6 Russian, 5 Western.
[120-12172]

UDC 578.833.26:578.53

MOLECULAR BIOLOGY OF ATTENUATED EASTERN EQUINE ENCEPHALOMYELITIS VIRUS

Moscow VOPROSY VIRUSOLOGII in Russian No 4, Jul-Aug 83 (manuscript received 18 Oct 82) pp 50-53

SOLYANYK, R. G., KARPOVA, Ye. F., TSILINSKIY, Ya. Ya. and TYMCHISHIN, P. N., Tomsk Scientific Research Institute of Vaccines and Sera, USSR Ministry of Health; Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] Determinations were made of certain molecular parameters of Eastern Equine Encephalomyelitis virus, attenuated by addition of dimethyl sulfate to the tissue culture (EEE-DMS-20/6). The sedimentation coefficient of the purified and concentrated virus in sucrose density gradient was found to be 280 S, giving a buoyant density of 1.19 g/cm^3. Electrophoretic analysis of the EEE-DMS-20/6 revealed three viral proteins with molecular weights of 50, 56, and 34 kdaltons. Negative staining with uranyl acetate yielded a value of 28-77 nm for the diameter of the virions on electron micrographs. In none of the parameters under consideration did the attenuated strain differ from the wild strain. Figures 5; references 18: 5 Russian, 13 Western.
[120-12172]

UDC 579.833.26:579.223

SEDIMENTATION ANALYSIS OF MACHUPO VIRUS RNA

Moscow VOPROSY VIRUSOLOGII in Russian No 4, Jul-Aug 83 (manuscript received 29 Dec 82) pp 69-74

LUKASHEVICH, I. S., LEMESHKO, N. N., GOLUBEV, V. P., STEL'MAKH, T. A., PETKEVICH, A. S. and VOTYAKOV, V. I., Scientific Reserach Institute of Epidemiology and Microbiology, Belorussian SSR Ministry of Health, Minsk

[Abstract] Sedimentation analysis was conducted on the RNA of Machupo virus, which is pathogenic for humans, for comparison with the RNA of Pichinde virus, an arenavirus which is nonpathogenic with respect to man. The buoyant density figures for Pichinde virus were 1.14-1.15 g/cm^3 in urographin, 1.19 g/cm^3 in sucrose and 1.25 g/cm^3 in cesium chloride. The buoyant density of the Machupo virus was likewise 1.25 g/cm^3 in cesium chloride. The RNA molecules of both viruses sedimented into four fractions: 7-10 S, 18 S, 20-22 S, and 28-30 S. The 18 S and the 28-30 S fractions were found to cosediment with cellular ribosomal RNA molecules indicating that Machupo virus, like other arenaviruses, contains ribosomal RNA. The 20-22 S fraction appears to represent the genomic RNA (S-RNA) of the Machupo and Pichinde on the basis of analogous reports in the literature. In addition to the 20-22 S RNA, addition of actinomycin D to the tissue culture permitted isolation in the late stages of reproduction of the 'heavy' viral RNA (30-31 S). Both viruses, therefore, appear to contain a fragmented genome (20-22 S and 30-31 S) and admixtures of cellular RNA moleculares. Figures 5; references 26: 3 Russian, 23 Western. [120-12172]

UDC 578.833.2:578.5].04:615.332

EFFECTS OF ACTINOMYCIN D, CYCLOHEXIMIDE AND HYPERTONIC NaCl ON REPRODUCTION OF TICK-BORNE ENCEPHALITIS VIRUS

Moscow VOPROSY VIRUSOLOGII in Russian No 4, Jul-Aug 83 (manuscript received 29 Oct 82) pp 96-100

ZHANKOV, A. I., DZHIVANYAN, T. I., LISAK, V. M., KOROLEV, M. B. and LASHKEVICH, V. A., Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow

[Abstract] Effects of actinomycin D, cycloheximide and hypertonic NaCl in various combinations were tested for their effects on reproduction of tick-borne encephalitis virus (TBE) in a tissue culture of embryonic pig kidney cells and production of virus-specific proteins. Additions of actinomycin D or in the actinomycin D + NaCl combination facilitated unambiguous electrophoretic identification of the virus-specific proteins NV5, NV4-1/2, NV4,

V3 and NV3, indicating that mRNA function was not affected under these conditions. However, extracellular titers of infectious virus particles were significantly reduced by treatment of the culture with actinomycin D or actinomycin D + cycloheximide combination. Furthermore, the latter combination did not facilitate identification of the viral proteins. Hypertonic NaCl or NaCl + cycloheximide had no effect on extracellular titers. The effectiveness of actinomycin D in inhibiting the production of infectious particles is assumed to involve interference with the production of viral RNA or alteration of the structure of the virus-specific RNA in such a manner as to render it noninfectious. Figures 1; references 12: 2 Russian, 10 Western.
[120-12172]

UDC 579.833.31.083.335

PASSIVE HEMAGGLUTINATION INHIBITION AND RADIAL GEL IMMUNODIFFUSION IN SEROLOGIC STUDIES ON MOSQUITO-BORNE VIRAL FEVERS

Moscow VOPROSY VIRUSOLOGII in Russian No 4, Jul-Aug 83 (manuscript received 30 Dec 82) pp 116-118

BATEN, M. A. KLISENKO, G. A. and MEL'NIKOVA, Ye. F., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] Studies were conducted on the development of reliable, sensitive, and specific serologic tests for use in the diagnosis of mosquito-borne viral fevers (Neapolitan, Sicilian, Karimabad). Tests on immunized mice and 160 human sera showed that passive hemagglutination inhibition and radial gel immunodiffusion hemolysis to be more sensitive than standard hemagglutination inhibition tests. Using sheep erythrocytes, passive hemagglutination inhibition was the most sensitive test in uncovering positive human sera (11.25%), followed by radial gel hemolysis (8%) and hemagglutination inhibition (9%). The agreement between passive hemagglutination inhibition and radial gel hemolysis was 61%, and, between the former test and hemagglutination inhibition, 50%. In developing areas, radial gel hemolysis may serve as a convenient screening and diagnostic test since it does not require serum dilution and is at once a qualitative and a quantitative method, is insusceptible to nonspecific inhibitors, and is relatively easy to perform. References 6: 3 Russian, 3 Western.
[120-12172]

UDC 578.833.27:578.74

FRACTIONAL POLYETHYLENE GLYCOL PRECIPITATION FOR PREPARATION OF VIRAL AND LOW-MOLECULAR WEIGHT NONVIRAL (SOLUBLE) ANTIGENS OF TICK-BORNE ENCEPHALITIS VIRUS

Moscow VOPROSY VIRUSOLOGII in Russian No 4, Jul-Aug 83 (manuscript received 3 Jan 83) pp 122-124

LYAPUSTIN, V. N. and LASHKEVICH, V. A., Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow

[Abstract] The effectiveness of polyethylene glycol 6000 (PEG) precipitation for the preparation and separation of viral and non-viral antigens (VA; NVA) of tick-borne encephalitis virus was studied with virus-containing tissue culture fluids. After two days of incubation, the infected pig embryo kidney cells were removed by centrifugation (10,000 g for 20 min) and dry PEG was added to the desired concentration for fractional precipitation. Following PEG solubilization, the test tubes were maintained at 4°C for 1h, the sediment was removed by centrifugation (10,000 g for 20 min), and then dissolved in 0.05 M borate buffer. The supernatant was then subjected to precipitation with a different concentration of PEG. Hemagglutination and gel diffusion studies on the various precipitates showed that 4% PEG can be recommended for the isolation of VA, while precipitation with 21% PEG led to the precipitation of NVA (after preliminary removal of other antigens with 7% PEG). Figures 2; references 7: 4 Russian, 3 Western.
[120-12172]

UDC 577.3

TOPOLOGICAL PRINCIPLES OF AUTOWAVE CLASSIFICATION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 271, No 6, Aug 83
(manuscript received 24 Feb 83) pp 1505-1507

GURIYA, G. T. and LIVSHITS, M. A., Institute of Molecular Biology, USSR Academy of Sciences, Moscow (Presented by Academician B. B. Kadomatsev, 17 Feb 83)

[Abstract] Self-sustaining wave regimes are found in many non-equilibrium physical-chemical and biological systems, e.g., excited cardiac tissue, among others. This present work attempted to show that quite general, topological considerations can be used to classify autowave regimes and to establish definite laws of preservation which must be fulfilled for any interactivity autowaves. It was shown that each autowave regime is characterized by a pair of topological charges. The interaction of autowaves, leading to confluence of features and breakdown of features into simpler ones should be subject to laws of preservation of the overall charges. Special attention was given to breakdown of double spirals into two single spirals. All autowave regimes observed up to now have a minimal first topological charge of $m \leqslant 1$ but more complex ones are possible. One hypothetical regime is shown. Figures 4; references 5: 2 Russian, 3 Western.
[060-2791]

PREVENTION VERSUS TREATMENT OF NONINFECTIOUS DISEASE

Moscow PRAVDA in Russian 24 Oct 83 p 3

[Article by Z. Yanushkevichus, academician USSR Academy of Medical Sciences and Lithuanian SSR Academy of Sciences, fector, Kaunas Medical Institute: "Attention: 'Risk Factor'".]

[Text] The health of inhabitants of developed countries is threatened, basically, not by infectious diseases, which physicians already know how to control well, but by chronic noninfectious diseases: ischemic heart disease, trauma, malignant tumors, diseases of the lungs and respiratory apparatus, diabetes and other illnesses. Naturally, the struggle to control them has become one of the most important tasks of Soviet public health.

The basic structure of this struggle is that of primary prophylaxis. It is necessary to eliminate the influence of a whole range of adverse factors, including first of all smoking, negative emotions, excessive consumption of fats and concentrated carbohydrates and insufficient physical activity. Each of these, and, more importantly, all of them together, can be the cause of the onset of illness.

Kaunas cardiologists examined 6000 men aged 40-59. Seven of the most significant "risk factors" in ischemic heart disease were revealed: arterial hypertension, smoking, elevated cholesterol level, malfunction in carbohydrate metabolism, obesity, insufficient physical activity and weak psychological stability. It turned out that the "risk factors", or disease that had already developed, were absent in only 13.4 percent of the men.

The following was observed in an examination of 1200 school children aged 10-15. Hypertension was found in 15.7 percent of boys and 13.3 percent of girls. Marked overweight was found in 5.9 percent and low physical activity in 25 percent of the children. Thus, the presence of 2 or more "risk factors" was found in 8.6 percent of the school children. Thus, the hypothesis concerning the necessity of looking for the source of ischemic heart disease in childhood was borne out.

The physicians went from observations to definite actions, which brought rather good results. Thus, after 2 years, blood pressure returned to normal in 53.6 percent of those with hypertension, more than 30 percent of smokers

stopped this harmful habit, and blood cholesterol levels returned to normal in 55.2 percent of patients. A procedure was developed which allows the uchastok physicians to determine a specific person's risk for developing ischemic heart disease.

On the whole, the measures for eliminating "risk factors" and a coherent system for the treatment and rehabilitation of patients suffering from ischemic heart disease have made it possible to reduce in-hospital mortality from myocardial infarction and acute coronary insufficiency by more than 40 percent, in comparison with 1970. This is an appreciable difference! And, obviously, this is not the limit.

Treatment of any disease is by its very nature a defense to which medicine must resort, but prophylaxis is an offensive action. The term prophylaxis must be considered to embrace not purely medical methods. For example, many measures to make the environment more healthy apply here, as well as the struggle with unfavorable occupational factors and harmful habits.

Nevertheless, it is no accident that medical personnel have been entrusted with such high expectations. We must think about a certain reorientation for physicians in this regard. Some of them are well acquainted with the newest developments in medical science; however, they are not well acquainted with the conditions in which their patients live and work. This sometimes leads to paradoxes. The patient now knows a lot about diseases and the physician often does not know enough about the patient. This causes a lack or a deficit in mutual understanding. This is why a patient who has become disullusioned with his physician seeks "nonstandard" treatment.

Therefore, physicians and the population must aim for active prophylaxis.

This is the course being followed in Kaunas, where development of a special program of primary prophylaxis for the major chronic noninfectious diseases has begun. Work on this program involves not just our city, but also 5 rural rayons. It will also be conducted on a republic-wide scale.

12262
CSO: 1840/126

UPDATE ON PROGRAMS FOR DEVELOPMENT OF MEDICAL EQUIPMENT IN THE USSR

Moscow EKONOMICHESKAYA GAZETA in Russian No 44, Oct 83 p 2

[Article prepared by the Scientific Organization Administration of the USSR State Committee for Science and Technology: "Health Care Equipment--Survey"]

[Text] One of the great achievements of socialistic society is free and highly qualified medical care available to all. At the present time, there are 40 physicians per 10,000 people in our country, as opposed to 8 in 1940 and 24 in 1965. The number of hospital beds per 10,000 has reached 127 (40 in 1940 and 96 in 1965). There has been immeasurable improvement in outfitting of therapeutic and preventive institutions with the latest equipment, apparatus and instruments. Steps are being taken, in accordance with the decisions of the 26th Party Congress and June (1983) Plenum of the CPSU Central Committee, to expedite broad introduction of scientific and technical advances into medical practice.

Under the 11th Five-Year Plan, the following scientific and technical programs are being fulfilled: "Search for new effective drugs, development of technology and assimilation of industrial production of new agents and their drug forms" and "Development and assimilation of production of medical instruments, apparatus and automatic equipment for prevention and diagnosis of diseases and treatment of the sick."

Sophisticated Equipment

There are 97 research and production organizations under 19 ministries and agencies involved in the program for development of new medical equipment. Its fulfillment will be instrumental in expanding introduction to clinical practice of the most progressive diagnostic and therapeutic methods. Work is going on in six directions.

The first direction is referable to 14 modern instruments for recording, analyzing and monitoring physiological parameters of the human body, including a family of monitors for obstetrics and pediatrics, which permit substantial improvement of monitoring mothers and infants in the prepartum and postpartum periods.

The DKI-N-02 portable defibrillator, which normalizes heart function, will find application under both hospital conditions and emergency medicine. There will be wide distribution of a set of instruments for invasive measurement of blood pressure and blood flow rate in the heart and great vessels, in order to define the diagnosis of diseases of the cardiovascular system and for evaluation during an operation of effectiveness of surgical correction of heart defects.

Another direction of work is concerned with use of 15 diagnostic and therapeutic instruments and apparatus based on use of ultrasound and lasers, holography, fiber optics, infrared, radioisotope and cryogenic equipment.

Under the current five-year plan, highly sophisticated, flexible endoscopes will be introduced, and in 1985 their output should exceed 4000 units. This is needed for effective endoscopic preventive screening of the public in order to pick up early forms of the most dangerous diseases, first of all oncological ones. A new generation gamma chamber is being developed, which is notable for expanded diagnostic capabilities, and this is quite important to examination of many internal organs.

Scientific research will be completed, the results of which will make it possible to make clinical use of therapeutic laser units to monitor radiation doses absorbed by tissues, and this will increase appreciably the efficacy of treatment of such diseases as trophic ulcers and extensive burns.

One of the most important directions is development of x-ray equipment with amplifiers of brightness of x-ray image, with use of computer to process the x-rays and systems for automatic control of unit operation.

Under the current five-year plan, output of modern scanning computerized SRT-1000 tomographs for examination of the brain has already been set up as stipulated in the scientific and technical program. In particular, they can be used not only as a means of visualization of internal organs in layers, but as measuring devices.

Computerized tomographs based on nuclear magnetic resonance [NMR] have special medical capabilities. NMR tomographs make it possible to examine not only the spatial structure of biological tissues, but to assess their quantitative chemistry. At the present time, models of the domestic NMR topograph are undergoing biomedical trials.

> Series production of the stationary "Roentgen-50-2" diagnostic unit will start in 1984. These units are intended to re-equip a wide network of polyclinics and hospitals. Mass production of the stationary "Roentgen-100T" unit will also start in 1984. This is a remote-controlled, multipositional standing unit that can be used for both routine and special roentgenological examination of internal organs.

The results of work on standardized automated systems for detection of early forms of cardiovascular, oncological, neurological, pulmonary and other diseases are called upon to aid in solving current and future Soviet health care

problems of providing various types of preventive examinations for the public. For example, standard automated systems for preventive screening of women and evaluation of physical condition of children have been introduced in 1983 for experimental use at polyclinics in Moscow. In 1984, systems for screening the public for cardiological and oncological diseases, glaucoma and objective hearing tests will be used on an experimental basis.

A large volume of work dealing with tasks on the program is being done in the direction concerned with introduction of apparatus and automatic equipment performing the functions of vital organs.

The artificial kidney machine with automated control of hemodialysis is quite effective in treatment of patients with acute and chronic renal insufficiency and extensive burns. A machine for reinfusion and direct blood transfusion makes it possible to utilize donor blood with untmost benefit. New means are being developed for stimulation of organs and tissues to suppress pain.

The tasks outlined in the program also include development and assimilation of production of materials, instruments and equipment for clinical use: for children's cardiovascular surgery, treatment of skin grafts in surgery for burns, kits of universal microsurgical instruments for ophthalmology and other branches of medicine.

It should be noted that more than 30% of the products being developed in accordance with this program are being assimilated by industry in accordance with the tasks outlined in five-year and annual state plans for economic and social development of the USSR.

Moreover, there are seven more scientific and technical programs in the field of health care. With their help, the most important problems of prevention, diagnosis and treatment of the main diseases are being solved.

New Agents

The first of the above-mentioned programs is based on refinement of methods of chemical synthesis. This is how the following agents, for example, were developed: camphonium and oxosoline, pyracetam, bromin, fotrin, fopurin and other drugs.

New drugs based on biosynthesis and chemical transformation constitute an important area of work. We should mention in this group, the new Soviet antibiotic, cephalexin, which was developed in 1982.

In accordance with the program, production of new drugs derived from substances of plant origin is being developed actively. Much work in this direction is being done by the scientific research institutes under the Ministry of the Medical Industry, Academy of Medical Sciences, Kirghiz Academy of Sciences, Uzbek Academy of Sciences, Georgian Academy of Sciences, Far East Research Center of the USSR Academy of Sciences and RSFSR Ministry of Higher and Secondary Specialized Education.

Research on enzymes and their inhibitors yielded a great effect. In 1982, production was organized of a highly effective product, streptodecase. In 1983, somilase production will be started; at the completion stage is a study of biomedical properties of ribonuclease and its effect on synthesis of interferon and antibodies for treatment and prevention of viral diseases.

Fulfillment of the program made it possible to introduce new technological processes of controlled biosynthesis in the production of antibiotics--tetracycline and penicillin, which have increased output of production by 15-20%, as well as to set up large-scale production of vitamins E, A and C.

> On the whole, research work on program assignments deals with more than 100 agents, and it will be completed for 32 of them under the 11th Five-Year Plan. The others will be introduced under the 12th Five-Year Plan.

There are provisions for development and strengthening of scientific research organizations, their material base, construction of experimental production installations. About 10 million rubles of capital investment have been assigned for these purposes. It has become possible to augment in 1985 the share of drugs with a shelf life of at least 3 years to 51.2%, versus 47.7% in 1975.

Responsibility for Success

On the whole, the tasks in the scientific and technical programs are being performed within the target dates. However, there are no grounds for complacency.

We were impressed by the unsatisfactory delivery to the medical industry of sophisticated and high-grade units of products and materials, primarily by the Ministry of the Chemical Industry and Ministry of Instrument Making, Automation Equipment and Control Systems. As a rule, the orders of the USSR Ministry of the Medical Industry and Ministry of Health are in small amounts and for "unadvantageous" products. In this regard, it is not superfluous to remind the administrators of allied sectors that there are not and cannot be any trivia in the matter of public health care.

The powerful material and technical base of health care, which has been developed recently, requires modern engineering and management support. Medical workers have now been armed with complicated and expensive equipment, the operation of which requires special training. The sophistication of technical outfitting of hospitals, polyclinics, walk-in and other therapeutic-preventive institutions is imposing new requirements on their administrators.

Unfortunately, the USSR Ministry of Health is slow in its reorientation. Engineering and laboratory services have still not been organized. The lack of scientifically validated current and long-term requirements for therapeutic and preventive institutions, with respect to equipment, makes it difficult to plan the development of a given technical direction, as well as a production base.

It would be desirable for the USSR Ministry of Higher and Specialized Secondary Education to pay attention to the need of teaching medical students the fundamentals of engineering and economics. Therapeutic and preventive institutions are on the verge of becoming enterprises of the industrial type by the nature of their equipment.

It is imperative for the USSR State Committee for Standards to take effective steps to assure standard ways and means of biomedical measurements. It is important to solve the problem of special testing units for medical equipment.

Modern medicine's success in the control of disease depends, under modern conditions, not only on medical skill, but refinement of medical instruments, apparatus and equipment, and their skillful use. Health care should become the affair not only of medical men, but developers.

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CONGRESS NOTES PROGRESS IN SOVIET PHYSIOLOGICAL SCIENCE

Baku VYSHKA in Russian 27 Sep 83 p 1 (24)

[Article: "Science on Guard for Human Health; 14th Congress of the All-Union Physiological Society imeni I. P. Pavlov in Baku"]

[Text] The symbolic representation of the brain -- the center of human higher nervous activity -- became the basis for the emblem of the 14th Congress of the All-Union Physiological Society imeni I. P. Pavlov which began its work on 26 September in Baku.

Exactly 80 years ago, in 1903, the great scientist whose name is borne by the association of Soviet physiologists first reported on the conditioned reflexes, which he had discovered, from the podium of the International Physiological Congress in Madrid. Decades have passed and the study of higher nervous activity has conquered the world, and in the USSR this branch of science has reached heights never before seen. And now the country's leading scientists have gathered in the capital of Soviet Azerbaijan in order to graphically review the achievements of Soviet physiological science, to discuss its current problems, and to plan the prospects of joint activity by physiologists with medical men and specialists in agriculture and to improve the teaching of physiology in learning institutions.

Over 1,400 scientists and specialists from Moscow, Leningrad and all the union republics, as well as scientific representatives from Bulgaria, Hungary, the GDR, Poland and Czechoslovakia participated in the work of the congress.

The opening ceremonies of the physiologists' forum were held in the festively decorated Palace imeni V. I. Lenin.

Participating in the presidium were members and candidate members of the Azerbaijan Communist Party Central Committee K. M. Bagirov, G. A. Gasanov, V. N. Konovalov, I. A. Mamedov, S. B. Tatliyev, L. Kh. Rasulova; CPSU Central Committee responsible worker Ya. I. Azhipa; USSR Deputy Minister of Health and General Director of the All-Union Cardiological Scientific Center of the USSR Academy of Medical Sciences Academician Ye. I. Chazov; Deputy Chairman of the Azerbaijan SSR Soviet of Ministers F. G. Akhmedov; Academic Secretary of the USSR Academy of Sciences Physiology Section, Academician P. G. Kostyuk; Chief of the CPAz Central Committee Science and Education Institutions Department

R. D. Mamedov; President of the AzSSR Academy of Sciences G. B. Abdullayev; USSR Academy of Sciences academicians N. P. Bekhtereva and Ye. M. Kreps; academician of the USSR Academy of Pedagogical Sciences A. G. Khripkova; directors of scientific institutions A. Angelov (Bulgaria), P. Mesarosh (Hungary), S. Klingberg and Kh. Mattiyes (GDR), K. Zelinski (Poland), S. Dostalek (Czechoslovakia), leading physiologists and specialists in the field of medicine, agriculture, etc.

Academician P. G. Kostyuk opened the congress with an introductory speech. Greeting its delegates and all the participants, he thanked the AzCP Central Committee and the government of the republic for their help in organizing and conducting the scientific forum and noted the importance of the Baku meeting in working out a program for the further development of fundamental and applied research in light of the tasks presented to Soviet science by the 26th CPSU Congress, the Plenums of the Communist Party Central Committee, and by the speeches of comrade Yu. V. Andropov.

Having reminded the audience of the path travelled by physiological science, the speaker noted that Soviet scientists are firmly following the principles of materialistic recognition of the nature of physiological processes laid down by I. M. Sechenov, I. P. Pavlov and other leading figures in this country's science. Recent years, the four-year period between congresses, have been characterized by an unprecedented expansion in the technical capacities of scientific institutions which, working at the boundary of numerous modern sciences, have also attracted the latest technology and research methods as their allies. All this facilitates an increased effectiveness of scientific developments and an acceleration of their introduction into medical and agricultural practice.

The congress, noted the scientist in conclusion, is being held in Baku, the beautiful capital of Azerbaijan, a city which is adorned by its monuments to history and rich in its remarkable revolutionary and labor traditions. Today it also has great scientific potential, with numerous achievements in physiology -- a young but successfully developing branch of Azerbaijan science.

The honorary presidium of the congress was elected with great inspiration, consisting of the CPSU Central Committee Politburo headed by comrade Yu. V. Andropov.

The working organs of the congress were also elected.

Republic Academy of Sciences academician G. G. Gasanov, Director of the Institute of Physiology imeni A. I. Karayev of the AzSSR Academy of Sciences, presented the speech, "Development of Physiological Science in Azerbaijan." He told of the formulation and development of physiological science in Azerbaijan and of the great lengths which it has come in a historically short time thanks to the help of Russian scientists, the USSR Academy of Sciences, and the republic academies. From the creation of the Department of Human and Animal Physiology at Azerbaijan State University in 1920 to the present large academic institute and system of specialized faculties and departments in the VUZes -- this has been the progress of this branch of science in our republic. The leading

direction of research at the present time is the study of the neurophysiological and biochemical bases of complex forms of behavior. Azerbaijan scientists are actively participating in the implementation of long-term comprehensive scientific programs. The Institute of Physiology has become the base in the system of academic scientific institutions throughout the country in the development of topics associated with the regulation of motivational behavior. Joint research with Czech colleagues is being successfully implemented within the framework of the international program "Intermozg."

The speaker assured that the republic's physiologists would apply all their efforts, energy and knowledge toward the further development of science and the effective solution of problems presented by the party.

Hero of Socialist Labor and Academician Ye. I. Chazov came to the podium. Having expressed his gratitude for the opportunity of presenting a lecture on the modern problems of physiology of the cardiovascular system to the congress, the cardiologist stressed the fact that today it is necessary to utilize scientific methodology in order to bring about proper cures, and that without a knowledge of the basic regularities in the functions of the healthy organism the modern doctor could not exist. The role of physiology especially increases in the present day, when in light of the decisions of the June Plenum of the party Central Committee and the speech by Comrade Yu. V. Andropov broad prophylactic measures are being developed and general dispensarization of the country's population is being planned.

In order to properly solve these problems, medical men must know what the healthy organism and the normal cardiovascular system are like and how they function, noted the scientist. The broad application of data from the fundamental sciences has always been characteristic for Russian and Soviet medicine in the treatment of patients. Today the further development of the clinical disciplines requires their close cooperation with the fundamental sciences, primarily with physiology and biochemistry. If we speak of cardiology and cardiovascular pathology, it should be noted that clinical practitioners still experience a feeling of dissatisfaction with their knowledge in the field of physiology of the cardiovascular system. Clinical practice has today become a unique physiological experiment.

The speaker gave a detailed account of the new methodological approaches to the study of modern clinical and mass observations of the population, to problems of regulating the activity of the heart and the vessels, and to the use of biochemical, electrophysical and other modern research methods by physiologists. He reported on the results obtained by scientists which open new possibilities in the search for means of combatting cardiac insufficiency.

In conclusion, Ye. I. Chazov told of new research on the study of the so-called surviving cells of the human organism performed at the cardiological center. All these scientific developments, he stressed, expand our knowledge of the functions of the cardiovascular system and create new theoretical concepts, new methods of treatment. Thus, they are directed at preserving the life and health of the Soviet man, for the sake of which we are all working.

Academician P. G. Kostyuk presented the paper, "Molecular Mechanisms of Basic Nerve Processes."

Professor A. M. Ivanitskiy, responsible secretary and doctor of medical sciences, presented a report on the work of the Central Soviet of the All-Union Physiological Society imeni I. P. Pavlov. In the reporting period, he said, the number of society members exceeded 7,400 and was increased by 10 collective members. The central soviet was engaged in the organization and implementation of scientific forums for scientists in our country and abroad and facilitated the closer scientific cooperation of Soviet physiologists with their colleagues in socialist and capitalist countries and the expansion of scientific ties. Ever greater attention is being given to introducing research results into the practice of public health, agriculture, public education, physical culture and sports. The creation of the comprehensive scientific programs "Mozg" [Brain] and "Gomeostaz" [Homeostasis] had great significance in concentrating scientific work on the most important directions.

Having related how the society facilitates the successful development of physiology -- one of the basic fundamental sciences of the medical-biological complex -- the speaker paused on the theoretical and applied problems which are being solved by scientists and on the research conducted in the union republics. He noted that holding the congress in Baku was an acknowledgement of the achievements of Azerbaijan physiologists. He presented information on the publications activities of VFO [All-Union Physiological Society] members and the popularization of scientific knowledge and dealt with questions of teaching physiology in the secondary school, creation of instruments and other apparatus, and the study of the history of physiological science.

The chairman of the society's revision commission, Professor B. S. Kuliyev, also presented a paper.

The congress ratified the reports of the Central Soviet and the Revision Commission of the All-Union Physiological Society.

This concluded the plenary meeting.

A concert by Azerbaijan masters of the arts was presented in conclusion.

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COURAGE FOR THE ENTIRE DAY

Moscow SOVETSKAYA ROSSIYA in Russian 27 Oct 83 p 4

[Article by V. Ivanchenko, candidate of medical sciences]

[Text] There are many medical institutions in our country: polyclinics, hospitals and sanatoriums. But they are for treatment of sick people. Where can one measure the health of a healthy person and reveal his body's reserves? In the Health Center. One of the first has been organized in Nal'chik at the Kabardino-Balkarskiy Transportation Administration. The center has served approximately 1300 drivers over a period of 2 years. Their main goal is to evaluate the reserves of organs and systems, to reveal conditions before illness occurs and to predict their development. Something new is already beginning in the registration--there are no lines, like there are in an ordinary polyclinic. For each administration coworker, a special "Health Card" is established according to the "traffic light" system. The green light is for absolutely healthy people, the yellow is for people in a pre-illness state, who need prophylactic measures. The red is for drivers who are registered at the health center. They need both preventative treatment and therapy.

Charts are hung on office doors with unusual names: "Simulator Trainers" [Trenazhernyi], "Psychoemotional relief" and "Oxygenophytotherapy". The more clearly understood are the functions of rooms for massage and physiotherapy. I asked physician-psychotherapist B. F. Remeslo whether it was worth it to open such a large center with a staff of 11 people. And he readily pointed out the necessity of creating the institution: previously, every second driver took sick-leave no less than once a year due to osteochondrosis of the spine. Now, this is done only by every third driver. After only the first year of operation, the number of illnesses of the bone-muscle system was reduced by one quarter, while the number of patients suffering from ischemic heart disease decreased one half. Approximately 30,000 rubles were spent on organization of the center, and the economic effect from the reduction of the sick rate in just the first quarter of 1983 amounted to 406,000 rubles!

Here is the opinion of the Administration workers themselves. Taxi driver A. Bazhenov said, "Sessions at the Health Center raise one's spirits, give one courage for the entire day and sharply increase work efficiency. Thanks to them I quit smoking." Driver A. Shevchenko said, "When it would start drizzling, I would begin to get a cold. Now it doesn't happen. The Health

Center toughens the body." I questioned other drivers. They were unanimous: "The Health Center serves a necessary, useful purpose." Meanwhile, it does not substitute the work of the excellent polyclinic of Administration: whereas the latter performs "capital repair" on the body, the center provides constant prophylaxis.

The goal of medicine of the future is to strengthen the health of healthy people. In Nal'chik today, the first steps on the path toward its achievement have already been taken.

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HEALTH RESORTS

Moscow PRAVDA in Russian 7 Oct 83 p 5

[Article by D. Velikoretskiy, candidate of medical sciences]

[Text] This year, the "Soviet Encyclopedia" press delighted readers by issuing an entire series of reference books. One more has been added to them--the encyclopedic dictionary "Health Resorts".

We have not had such an encyclopedia before this. It contains more than 150,000 articles about health resorts in the USSR, foreign countries, health resort areas of international renown, natural therapeutic agents and methods of sanatorium health resort treatment.

Fundamental principles of the organization and direction of the development of health resorts in the USSR are continuously connected with the name V. I. Lenin, with the victory of the Great October (Revolution), with the concern of the Communist Party and the Soviet government for preservation of our people's health and for organization of vacation for workers and sanatorium-health resort therapy. In pre-revolutionary Russia, the dictionary informs us, there were only 60 sanatoriums in all. Today in the USSR, sanatorium-health resort aid has actually become massive--in trade-union health resorts alone over the past five-year plan, approximately 47 million people vacationed and were treated.

The most extensive division of the book is about health resorts and health resort areas of our country, basic tourist centers and All-Union tourist routes.

The vacation and health resort industry of socialist countries is presented in detail in this dictionary. For the first time in the world, a wealth of information has been gathered in it about health resorts of all regions of the earth. The publisher managed to attract practically all leading health resort specialists of the USSR and many foreign specialists for the preparation of this encyclopedic handbook.

The dictionary contains information of both a purely medical nature, and also exhaustive facts on the geography, history and architecture of health resorts and stories about cultural monuments and other objects of tourism.

As for deficiencies in this publication, there is a lack of information on health resort objectives of some Asian countries. In my opinion, the quality of the 700 color and black-and-white illustrations in the reference book will not always satisfy the modern particular reader. In addition, a portion of the travel slides in general do not have any information. The writing under others is confused.

Nevertheless, I am certain that this encyclopedic dictionary will become a useful book for organizers of health care and sanatorium-health resort affairs, trade union activists, in a word, all of those who are involved with the selection and direction of workers to health resorts and sanatoriums, tourist centers and vacation resorts. The book is also interesting for the mass reader.

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CHILD ABANDONMENT

Moscow LITERATURNAYA GAZETA in Russian No 34, 24 Aug 83

[Article by E. Ch. Novikova, Assistant USSR Health Care Minister and commentary by the Department of Communist Education]

[Text] An article by N. Loginova, "Podkidysh", published on March 23, raised important questions the solution to which requires the joint efforts of several interested departments. In connection with this, the article has been discussed in the USSR Ministry of Health and the USSR Ministry of Education.

According to the present situation, children who, for various reasons, are deprived of parental care are under the supervision of the USSR Ministry of Health children's home system from birth to age three, and then are transferred to children's homes of the USSR Ministry of Education system. Children with either physical or mental developmental defects are brought up in specialized children's homes until they are 4 years old, and then are transferred to the home-boarding school system of social welfare.

Thus, according to the report of the RSFSR Ministry of Health and the RSFSR Ministry of Education, a serious situation has arisen in Novgorod Oblast with vacancies in pre-school children's homes of the educational system; as a result of this, 3-year old children in baby homes who should be transferred to children's homes are held back.

The shortage of vacancies is a reason for holding 4- and 6-year old children in the Novgorod children's hospital, which was the subject of the "Podkidysh" article, while certain children (Grigor'eva, Nikolaeva, Andreeva) could not be put up for adoption because of medical contra-indications or due to the absence of legal documents (parental release). At present, these children are in the Borovichskiy pre-school children's home. Some of the children--Vitaliy Krutkin, Sasha Semenov and Sasha Eliseyev--have remained in the hospital for a long time, since their parents did not release them (they occasionally visited them) and they did not give permission for them to be put in a baby home or up for adoption. At the present, the parents' permission has been received, and the children have been transferred to the baby home.

A similar situation has also developed in Novosibirsk Oblast: according to the structure of the baby home, there are 117 children on the register, while until the present, 60 children older than 4 years have been in specialized baby homes, and these children have not been transferred to children's homes due to a lack of vacancies.

The RSFSR Ministry of Education and the RSFSR Ministry of Health reported that measures are being taken to remove difficulties in placing children in pre-school children's homes. Letters have been sent to oblispolkom [oblast executive committee] presidents of the Irkutsk, Kalinin, Kaliningrad, Kuybyshev, Murmansk, Novgorod, Novosibirsk, Perm, Saratov and Tula Oblasts (in which the deficiency of placements for children into certain institutions is sharply felt) with a request to expand vacancies in these institutions.

According to present data, a new pre-school children's home with 200 vacancies has been opened in Irkutsk Oblast; in Kuybyshev Oblast, a home with 120 vacancies, and, in Novgorod Oblast, a home with 100 vacancies. A pre-school children's home is being constructed in Murmansk and Tula Oblasts and documentation for construction of pre-school children's homes in the Kalinin, Kaliningrad and Novosibirsk Oblasts has been prepared.

The USSR Ministries of Education and Health consider adoption to be one of the best forms of governmental placement for children who are left without parental care. However, a significant number of children cannot, for several reasons, be given to a family to raise: because of medical contra-indications, because the mother or father do not consent or other reasons.

The joint efforts and competency of organs of people's education and health care on the problem of adoption for children is regulated by "Instructions for the order of putting children and youths up for adoption", approved by the USSR Ministry of Education and the USSR Ministry of Health.

The USSR Ministry of Education and the USSR Ministry of Health consider the existing system of adoption for adolescents and children to have been completely justified and does not need to be reviewed. The adoption issue is being decided by the ray(gor)ispolkoms [rayon or city executive committees] of People's Deputies' Soviets, which strictly observe the legality, pedagogical value and medical indications for adoption.

The problem of collecting child support from "off-the-track" mothers and fathers and transferring it to special facilities of the children's home has been reviewed by interested departments many times, but support has not been found, since searches for this category of parents are usually complicated, and their material situation, as a rule, is insufficient.

Commentary

The editor thanks the Assistant USSR Minister of Health, Yelena Cheslavova Novikova, for the detailed and thorough reply to our publication. The shortage of vacancies in children's institutions is a problem everyone can understand. A small child who is not entirely healthy and cannot be put up for adoption so that this action will not bring about new (moral) trouble in his future family--this is also understandable to everyone (there is not, most likely, a more serious legal affair than the denial of adoption for a child due to objective reasons, and such affairs take place in civil courts). And that is why it is clear that ispolkom workers who are in charge of guardianship and adoption really must strictly observe, as is said in the official reply, the legality, and scrupulously review the pedagogical value and medical indications for adoption every time.

Nevertheless, there is a phrase in the official reply with which it is difficult to agree. Here it is: "The USSR Ministry of Education and the USSR Ministry of Health consider the existing system of putting children and youths up for adoption to have been [the following is boldface and all caps] completely justified and does not need to be reviewed" (our boldface--editor).

In general, it is hardly possible in the sphere of social life that there are "systems" which do not require improvement, as far as to justify themselves "completely". But this is a usual retort. And, in particular, it is sufficient only to look through the abundant mail on its way to all newspaper editors and directly to guardianship organs from people who want to adopt a child in order to convince oneself: there is something to "review" and improve in the system.

And first of all--its cultural level, which is evidently lagging behind the demands of modern life. Involved in this are the operability of information (where today the formations of documents is finished for a healthy child who can be adopted), the clearer validity of legal rules of adopters, and, most important, (about which candidate parents complain most of all) the improvement of business relations between applicants and those who are deciding the fate of their applications. "They did not answer for 4 months", "we had to collect a mountain of paper, which turned out to be unnecessary", "for 2 months we went there, like going to work, but no-one clearly explained anything to us", "I unsuccessfully send letters, to which I receive no reply"--in similar phrases, complaints appear from people who turned to guardianship organs and from there carried away not only a refusal (maybe well-founded), but also a feeling of offense (this should not take place there, where business relations are placed on a high level).

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CARE OF WOMAN AND CHILD

Kishinev SOVETSKAYA MOLDAVIYA in Russian 13 Oct 83 p 4

[Text] The most important aspects of medical service to the populations were examined at the XIV All-Union Congress of Obstetricians and Gynecologists, which opened on October 11 in Kishinev. Health service organizers, scientists and practical physicians are discussing achievements and the course of further perfection of health care for women and children in light of resolutions of the XXVI CPSU Congress and subsequent plenums of the CPSU CC. Specialists from Bulgaria, the GDR, Hungary, Cuba, Poland, the CSSR, Yugoslavia, India and Finland are participating in the forum.

The USSR Congress was opened by the assistant to the USSR Health Service Minister, E. Ch. Novikova.

With great enthusiasm, the congress delegates elected the honorable presidium in the CPSU CC Politburo.

In the name of the Moldavian Communist Party CC and the republic government, Vice-President of the Moldavian SSR Soviet of Ministers, N. P. Kiriyak, addressed members of the medical forum. She stressed that they regard the course of the congress in Kishinev as an acknowledgement of specific achievements of our republic in the field of health care, which endured great changes over the years of Soviet power. It is the result of the wise Lenin national politics of the Communist Party, fraternal aid for all people of the USSR and first of all for the great Russian people. Comrade Kiriyak expressed confidence in the fact that the XIV All-Union Congress of Obstetricians and Gynecologists will become an important event in the medical life of the country, and wished its participants success in their work.

GDR Professor Bodo Zarembe welcomed the forum delegates. Such meetings, he noted, enable the exchange of the latest scientific information and the strengthening of contacts between scientists of different governments.

At the first plenum of the forum, which was directed by the president of the All-Union Scientific Society of Obstetricians and Gynecologists and member-correspondent of the USSR Academy of Medical Sciences, G. M. Savel'eva, lectures were given by the assistant to the USSR Health Care Minister, Professor E. Ch. Novikova, director of the All-Union Science-Research Center of Health

Care for Mother and Child, Professor V. I. El'tsova-Strelkova, assistant director of the main directorate of therapeutic-prophylactic aid to children and mothers of the USSR Health Care Ministry, medical sciences candidate N. G. Baklaenko and head of the Department of Obstetricians and Gynecologists of the Kishinev State Medical Institute, Professor G. A. Palladi, along with several reports. M. I. Trubitsyna, CPSU CC executive, and M. S. Platon, head of the Department of Science and Educational Institutions of the Moldavian Communist Party CC are participating in the congress.

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BRIEFS

HEALTH TOWN--An original health town has been developed in a northeast section of Bel'tsy. A complex of medical institutions was set up here which was recently enlarged by a new children's polyclinic. Constructed on resources from Lenin Communist Free Laborers, it is designed for 540 visitors a day. In the four-story building there are several dozen medical offices. Two specialized brigades of physicians will render necessary aid to the townspeople from 8:00 AM to 8:00 PM. Besides traditional subdivisions, a rehabilitation therapy department will also open. In two baths of a small pool, small infants will be receiving hydrotherapy and they will undergo the first exercises of the swimming treatment group. The high qualifications of personnel and the latest medical equipment will allow for the treatment of many illnesses. The physical therapy room with water-baths and mud-baths, massage and work therapy will be a great aid in this.

Personnel collectives of Furniture Training Center No 3, production from the new Association imeni V. I. Lenin and masters of the municipal department of the Moldavian SSR Artistic Fund have greatly aided in equipping and organizing this medical institution.

The new children's polyclinic is still only preparing to receive its first patients, while nearby construction has already begun on a multi-profile hospital for adults. [Text] [Kishinev SOVETSKAYA MOLDAVIYA in Russian 13 Oct 83 p 4] [Article by Bel'tsy reporter M. Svetayev] 12473

PHYSICIAN TEACHES PHYSICIAN--More than 20 series of visits, the task of which is to instruct physicians in hospitals, were conducted this year by personnel of the Leningrad Institute for Advanced Training of Physicians imeni S. M. Kirov. They visited Kaunas, Rostov-on-the-Don, Krasnoyarsk, Murmansk, Magnitogorsk and other cities.

For the first time in the RSFSR, the department of physiology and pathology of children organized similar studies with physicians of Bashkiria. Over a period of a month, the department head, Professor V. P. Medvedev, and candidates of medical sciences S. M. Anisimova, V. A. Chetverikova and others gave lectures and conducted seminars and practical studies. Approximately 40 physicians of

the republic were given the opportunity, without going to Leningrad, of improving their knowledge in the field of developmental physiology and to recognize in more depth of the features of the course of children's diseases. A collective of Leningrad physicians was awarded honorary certificates from the Bashkir ASSR Ministry of Health

Also, scientists from the Chair of First Aid [skoraya pomoshch] has conducted a visit [out-of-town or field-trip] series for the first time. Thanks to them, physicians of Yaroslavl' received training for intensive therapy and reanimation, first-aid therapy and surgery. [Text] [Leningrad LENINGRADSKAYA PRAVDA in Russian 16 Jul 83 p 4] [Article by B. Pipiya] 12473

CSO: 1840/095

BRIEFS

CHILDREN'S HEALTH PROGRAM--Veterans of labor previously working in various spheres of children's public health will conduct lessons in the well children's school which has opened in the physician's out-patient clinic in the village of Nikoren. Experienced specialists have prepared a series of lectures and talks about the proper nutrition of infants and the prevention of illness, physical training and daily schedule for young mothers--the listeners at this unique medical general education center. Protecting the health of the mother and child is a subject of constant concern not only for the medical men of Nikoren, but also for the collective of the Kolkhoz imeni Suvorov. The farm, in particular, provides the children in its kindergartens and nursery schools with nutritious meals and supplies the rural school's extended day learning groups with hot breakfasts and lunches and fresh milk. Children's outdoor clubs and school physical culture groups created at the village stadium also help to strengthen the health of the growing generation. [Text] [Kishinev SOVETSKAYA MOLDAVIYA in Russian 4 Oct 83 p 2] 12322

STOMATOLOGICAL CLINIC SERVICES--Resident of Tash-Tyube village in the Alamedinskiy Rayon M. Ya. Onishchenko asks for a clarification of why the republic stomatological polyclinic will not serve village residents. The Kirghiz SSR Ministry of Health reports that the republic polyclinic is a consultative-methodological center for the republic's stomatological network.

Practical help (treatment, tooth extraction and dental prosthesis) is rendered only to the population of remote rayons where there are no stomatological facilities. The residents of Alamedinskiy Rayon receive stomatological aid and prosthesis in the rayon hospital. [Text] [Frunze SOVETSKAYA KIRGIZIYA in Russian 16 Oct 82 p 2] 12322

PSYCHOLOGY

ROSES IN WINTER, WHY THE WORKER'S COLLECTIVE NEEDS A PSYCHOLOGIST

Moscow IZVESTIYA in Russian 13 Sep 83 p 3

TUTORSKAYA, S.

[Abstract] Attention is directed to work at the just-concluded 6th All-Union Congress of Psychologists which examined problems of the human personality and its behavior in society. Service of psychology in industry was one area of interest of the Congress. The importance of psychological services in modern industrial activity was attributed by participants to work conflicts and the resolution of their consequences which allegedly take up 13 percent of work time (three days a month) at some enterprises and from the fact that most cases of myocardial infarction are related to stress, especially in cases involving white collar and industrial workers. A preventive approach is now being used by industrial psychologists. Using the case of "Kurganpribor" industrial association and the general director Ye. V. Taranov as an example, improvements made as the result of interaction of workers and managers, consideration of the social and everyday aspects of life, attempts to optimize work conditions, deeper involvement of workers in the total production process, reduction of fatigue and accident rate and improvement of occupational selection were listed and discussed. The need for more directors like Taranov was emphasized.
[099-2791]

PREVENTION OF OVINE BRUCELLOSIS

Moscow VETERINARIYA in Russian No 6, Jun 83 pp 15-16

YUSUPOV, O. Yu., Daghestan Scientific Research Veterinary Institute

[Abstract] Prevention and control of ovine brucellosis is covered from the standard approach consisting of isolation and slaughter, as well as immunization. The latter has acquired greater significance in recent times in view of the development of new, highly immunogenic vaccines such as those of strains 19 and Rev-1. Rev-1 has been found particularly useful in preventing abortions and shedding of the bacilli with milk, affords long-term (3-5 years) protection against natural infections, and is without adverse effects. The use of Rev-1 and other means of preventing brucellosis raises the possibility that this infectious disease may soon be liquidated.
[121-12172]

UDC 619:614.9-36.2+091:616.995.7

OVINE WOHLFAHRTIOSIS: EPIZOOTOLOGY AND PATHOMORPHOLOGY

Moscow VETERINARIYA in Russian No 6, Jun 83 pp 19-20

ISIMBEKOV, Zh. M. and ZHUMABEKOV, Kh. S., Semipalatinsk Zooveterinary Institute

[Abstract] In the Semipalatinsk Irtysh region cases of ovine wohlfahrtiosis are registered from May to September, with case load peaking in June and July. Generally, 15-30% of the sheep are infested with 104-116 larvae per lesion. The regions of the body most frequently affected are the perineum, vulva, prepuce and the extremities. Most cases have a favorable outcome with healing of the lesions. A few cases with affected gill, groin, and/or auditory organs may become progressive with a questionable outcome and a strong proliferative response.
[121-12172]

UDC 619:616.986:636.4

HISTOLOGIC DIAGNOSIS OF SWINE DYSENTERY

Moscow VETERINARIYA in Russian No 6, Jun 83 pp 67-68

DOMNIN, V. G., Leningrad Veterinary Institute

[Abstract] Details are presented of a histologic silver impregnation technique found useful in the identification of Treponema hyodysentery, salmonella, and other bacterial agents causing or involved in swine dysentery. Samples of the swine colon are fixed in 10% formalin for at least 48 h, thin paraffin sections are prepared, and impregnated with silver. The details involve deparaffination in 96% alcohol for 5 min and treatment with 3% silver nitrate for 18-24 h at 52-54°C, retention in distilled water for 3-5 min with three changes of water, reduction of the silver for 3-4 h with 0.5-1% hydroquinone in 50% alcohol at 52-54°C, treatment with carbol-xylene for 4-5 min and impregnation with balsam. The microbial agents appeared as dark-stained bodies identifiable on the basis of typical morphology. Figures 3.
[121-12172]

UDC 619:576.807:576.851.48

SEARCH FOR RAPID METHOD OF ESCHERICHIA IDENTIFICATION

Moscow VETERINARIYA in Russian No 6, Jun 83 pp 71-72

POLYAKOVA, O. A. and YEVGLEVSKAYA, N. I., All-Union Institute of Experimental Veterinary Medicine

[Abstract] A survey is presented of the various biochemical methods for the identification of the different genera in the Enterobacteriaceae family, which involve largely the fermentation of sugars, Voges-Proskauer reaction, hydrogen sulfide formation, gelatin digestion, etc. One approach to an accelerated identification consists of using Ginchev's medium in Kitchenko's modification for the identification of genera forming indole and hydrogen sulfide on the basis of a color change on a test strip of paper impregnated with oxalic acid and lead acetate. Within 20-24 h, a preliminary differentiation can be obtained in which E. coli forms a crimson color, Citrobacter an orange color, Proteus a muddy green color, Hafnia gives a red color, and Providencia and Klebsiella fail to give a color change.
[121-12172]

OVINE BLUETONGUE: WESTERN LITERATURE SURVEY

Moscow VETERINARIYA in Russian No 6, Jun 83 pp 72-74

BAKULOV, I. A. and KOZLOVA, D. I.

[Abstract] A review is presented of Western literature on the spread of bluetongue from Africa to other continents since the forties. Spread is believed to be via insects and, in addition to sheep, is known to afflict cattle, goats, and some other domestic animals. In a new focus of infection the mortality among sheep may approach 70-90%, and cattle are now believed to constitute an important reservoir since infections are usually asymptomatic. Continuous evolution of the bluetongue virus is indicated by the constant appearance of new serotypes, and, while immunity against homologous strains is highly effective, that against heterologous varieties is weak. A number of serologic tests have been developed for the diagnosis of bluetongue to complement animal tests and tissue culture procedures. Definitive diagnosis requires virus isolation since it has been shown that the bluetongue virus cross-reacts with orbiviruses.
[121-12172]

UDC 619:616-093/.098

COLONIC MICROORGANISMS IN DYSENTERIC SWINE

Moscow VETERINARIYA in Russian No 10, Oct 83 pp 35-37

ZAVIRYUKHA, A. I., KHARCHUK, A. N., ANDRUSENKO, I. T., ALEKSANDROVA, I. K., ANELOK, I. P. and GORODISSKAYA, Yu. I., Ukrainian Scientific Research Institute of Veterinary Medicine

[Abstract] Standard microbiologic studies were conducted on the colonic bacterial flora of healthy and dysenteric swine to determine and identify those bacterial species that may contribute to the pathogenesis of Treponema hyodysenteriae. Aeromonas and Vibrio were implicated by bateriologic techniques and electron microscopy to be involved in the course of swine dysentery and to contribute to its severity. Suckling rabbits were found to constitute a suitable host animal to serve as a model for the enteropathogenic Aeromonas and Vibrios in the evaluation of their role in Treponema hyodysenteriae-induced dysentery.
[125-12172]

UDC 619:615.372:616.988.13:636.5

FOWLPOX VACCINE

Moscow VETERINARIYA in Russian No 10, Oct 83 pp 37-39

SHIRINOV, F. B., FARZALIYEV, I. A. (deceased), IBRAGIMOVA, A. I. and KERIMOVA, S. N., Azerbaijan Scientific Research Institute of Veterinary Medicine

[Abstract] Description is provided of the extensive testing that has been conducted in the USSR on the safety and effectiveness of an embryo-derived fowlpox vaccine (attenuated strain 27-ASH). The vaccine was found to be entirely safe for chickens and turkeys, nonreactogenic, and highly immunogenic. The duration of induced immunity in chicks exceeded 4 months, in chickens 10 months, and 7 months in 67-day old turkeys. By comparison, the immunity evoked by immunization with the New Jersey strain vaccine was three to five months shorter, depending on the age of the immunized birds.
[125-12172]

UDC 619.981.45:636

ANIMAL PASTEURELLOSIS

Moscow VETERINARIYA in Russian No 10, Oct 83 pp 43-47

SIDOROV, M. A., Moscow Technologic Institute of the Meat and Dairy Industry, and GEVEDZE, V. I., Belorussian Scientific Research Institute of Experimental Veterinary Medicine

[Abstract] A survey is presented of pasteurellosis in domestic and wild animals, with emphasis on the almost universal animal susceptibility to this disease. This is particularly true in the case of the young of the various species. Rabbits, white mice, and pigeons are the laboratory species most susceptible to pasteurellosis and constitute convenient animal models, while the guinea pig is considerably more resistant but succumbs within 36-48 h after an intraperitoneal injection with the causative organisms. In addition to the standard slaughter-and-sanitize measures commonly employed for the control and prevention of pasteurellosis, immunization programs have also been attempted with some success. Experience has shown that vaccines and antisera should be based on the highly-immunogenic, encapsulated strains of Pasteurella multicida. In the USSR, vaccines intended for the protection of cattle and small horned animals should be prepared from serotypes A and B, for the protection of swine from serotypes A, B and D, and for the prevention of chicken cholera serotype A vaccine should be used.
[125-12172]

BRIEFS

BIOLOGISTS' CONFERENCE ON RADIATION--The All-Union Conference of Biologists concluded its work in Andizhan on 5 November on the topic: "Radiosensitivity of the Organism and Possibilities of its Modification." Leading scientists from Moscow, Kiev, Tashkent, and other cities of the country participated. The meeting participants centered their attention on questions of the effect of radioactivity on living organisms and plants. Numerous examples of using small doses of radiation for increasing crop yields of various agricultural cultures were given, as well as examples of increasing the productivity of certain domestic animals and poultry. [Text] [Tashkent PRAVDA VOSTOKA in Russian 6 Nov 83 p 3] 12322

MISCELLANEOUS

NEW GENERATION OF ANTIBIOTICS

Moscow PRAVDA in Russian 29 Sep 83 p 2

[Article by A. Fokin, academician and director of the Institute of Heteroganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences and I. Berezin, corresponding member of the USSR Academy of Sciences and director of the Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences]

[Text] Antibiotics play a major role in control of severe infectious diseases. Thanks to them, many ailments which have threatened humanity for centuries are things of the past.

In conjunction with useful properties, penicillin has no equals in this class of substances. Nevertheless, the experience with its use for more than three decades has brought disappointments as well. Cases appeared more and more in which this drug did not work. The cause was discovered in the molecular level. Microbial agents, interacting with antibiotics, found defense weapons--specific enzymes which destroy the medicine molecule, converting it into inactive disintegration products which are sometimes toxic to the body.

Resistance of microbes to antibiotics has become a serious problem for medicine. It was decided to use the natural structure of the antibiotic as a basis for the directed change of its properties with the aid of chemical or other methods. A new generation of antibiotics has appeared, which has received, in view of its origin, the name semisynthetic. They greatly exceed natural antibiotics with respect to medicinal properties.

But scarcely has a semisynthetic antibiotic been created when it is necessary to further work out the technology of its mass production. For many years, this has been pondered by specialists of the All-Union Scientific Research Institute of Antibiotics, Moscow State University imeni M. V. Lomonosov, the Tallin Polytechnic Institute, the Riga Medicine Plant of the Institute of Organic Synthesis of the Latvian SSR Academy of Sciences, the Saransk Medicine Plant and the Industrial Association "Mosmedpreparat" imeni L. Ya. Karpov.

Extensive collaboration of representatives from various fields of science and engineering guaranteed very important results. Under the direction of Corresponding Member USSR Academy of Medical Sciences, S. M. Navashina, a large complex work has been completed, "The creation of scientific bases, the

development of technology and the industrial introduction of biocatalytic processes for producing key compounds for the production of beta-lactam antibiotics", which has been nominated for the USSR State Prize Competition.

Necessary changes of natural penicillin begin with its division into two heterodynamic parts. The first of these, the so-called "nucleus" of the antibiotic (t-aminopenicillanic acid), will serve, in the future, as a basis for the production of new effective antibiotics. The second, although less valuable, can be recovered for the biosynthesis of penicillin. Consequently, there is no waste here, which is also attractive in the selected approach. But splitting the penicillin molecule is very difficult. Such a "surgical operation" is, in general, possible with traditional chemical methods, but it entails great complications. Therefore, it was decided to search for other methods. The research idea turned to biocatalytic methods.

First of all, it required a sufficiently sharp instrument for the molecular operation--an enzyme with a high specificity of effect. Selectionists, microbiologists and technologists have managed to discover the sought product--penicillin-amidase. In addition, effective methods for its biothynthesis were developed. Biologists and chemists discovered on what the activity and stability of this enzyme depends and learned to convert it into a form convenient for technology. The immobilized (unable to move) active enzyme became easy to divide after reaction from the solution in which it was located, and it could be used many times. It was found how to make the maximum stable original substances and products of the reaction. Effective methods for separating and purifying the products were developed. Technologists provided the process with simple equipment. As a result medical industry obtained a progressive technology for production of key compounds for preparing new penicillins and caphalosporins.

Introduced subsequently in 1975 and 1976 at the Riga and Saransk Medicine Plants, it has become the first industrial process of engineering enzymology in the USSR. On the basis of accumulated experience, biocatalytic technology for producing the key compound for manufacturing caphalosporine was developed and introduced in 1982. This is an original process which has no counterparts abroad. Fundamental research of the collective demonstrated that enzymes may be successfully employed for producing a series of other compounds which are necessary for the production of new antibiotics.

The basic advantage of biocatalytic methods is their high efficacy, the improvement of work conditions for personnel (it obviates contact both with the microorganisms and with organic solvents and aggressive reagents), the practical sbsence of product waste and a sharp rise in work productivity. The yield of products increased 1.5-fold. The economic effect from the introduction at the Saransk and Riga Medicine Plants amounted to 36 million rubles. The reduction in spending allowed for a sharp decrease in wholesale prices for semi-finished products, which created the basis for expanding production of semi-synthetic antibiotics and their output increased more than five-fold. The cost of raw material decreased by more than 46 million rubles.

In native Soviet and international scientific literature, participants in the research have published 110 scientific reports, and were credited with 30 patents. The immobilized enzyme and antibiotics produced with its aid are expected.

12473
CSO: 1840/097

INSTITUTE WORK ON MARINE ENVIRONMENTAL PROTECTION CITED

Kiev PRAVDA UKRAINY in Russian 5 Oct 83 p 4

[Article by Yu. Zaytsev, chief of the Odessa Branch, UkSSR Academy of Sciences Biology of Southern Seas Institute and corresponding member, UkSSR Academy of Sciences: "The Sea Needs Care; Nature is Our Common Home"]

[Text] Today the question of how to build our relations with nature is becoming ever more urgent. There are many examples of a careful attitude toward nature. However, there is also still an abundance of problems. Some of these are solved by our branch, which together with other collectives develops economically substantiated technologies applicable to the sphere of relations "Man and the Sea".

For example, recommendations for building artificial reefs were presented on the basis of created fundamentals in the theory of biologically active sea surfaces. For the first time in the practice of hydrotechnical construction, these structures not only strengthen the shores, but also stimulate biological processes in the sea, facilitating directed enrichment of the fauna and flora in its coastal zone.

The first kilometer-long artificial reef built according to the project of the "ChernomorNIIproyekt" Institute in the region of the new Southern Port in Odessa Oblast has made it possible to enrich the fauna in this section of the Black Sea within a period of three years. Instead of seven there are now 28 species of animals, and their biomass has increased from 0.2 to 9 kilograms per square meter. The biomass of seaweed has increased by tens of times. Aside from the great ecological effect, such technology of coastal protection makes it possible to significantly economize on cement and other building materials.

Together with specialists from the Odessa Higher Marine Engineering School, our scientists developed an ecologically safe method of combatting scale formation in shipboard heat exchangers by means of using products of fuel combustion instead of the traditional acids and other substances harmful to the sea. The new method is currently being introduced on fleet vessels.

In connection with this, I would like to stress the necessity in principle of an ecological study of all work projects related to the natural environment. This is mandated by legislation, but unfortunately is not always performed.

Sometimes it happens that a project prepared by one department or another turns out to be one-sided: only "its own" specific interests are primarily considered in it. As a result, interdepartmental conflicts arise in the realization of such projects. As a rule, they are concluded with a call (or an order) issued to specialists -- biologists and ecologists: save us, quickly help [us] correct and complete the project! However, to complete and correct that which has already been done is much more complicated than to participate in the ecological substantiation of the project at its very inception.

For example, recently our Odessa Branch of the Biology of Southern Seas Institute, in conjunction with the UkSSR Academy of Sciences Hydromechanics Institute, had such occasion to "save" the "Azovstal'" Metallurgical Plant in Zhdanov, whose production activity began to have a negative effect on the Sea of Azov. A solution was found. However, it would have been both cheaper and more effective had the planners at the "Ukrgipromez" Institute Zhdanov Branch come to the marine environmental specialists in time.

The timely consultation of ecologists is particularly important in the construction of major national economic facilities, as for example the dam on the Dnieper-Bug estuary envisioned by the USSR Food Program which will improve provision of fresh water to the southern portion of our republic for irrigation and other purposes.

The propaganda of ecological instruction to the population -- the clarification of laws of nature and modern specifics of the problem "Man and the Biosphere" -- is also called upon to play a notable role.

There is yet one other aspect to the problem: the close connection between research oriented toward environmental protection and work aimed at the rational utilization of natural resources. Thus, we have evaluated various regions of the Black Sea shelf from the standpoint of their suitability for mariculture -- the breeding of certain sea inhabitants. Moreover, the reserves of mussels and jellyfish have been computed, and the reserves of mussel valves and active silt on the shelf are currently being determined. All this, as shown by the work of specialists at the VASKhNIL [Academy of Agricultural Sciences imeni V. I. Lenin] Odessa Department on the Application of Marine Food Organisms who are working with us, may serve as a promising addition to the rations of agricultural animals and poultry.

The joint work of the Odessa Branch of the Biology of Southern Seas Institute with the UkSSR Academy of Sciences Physical Chemistry Institute on determining the quality of Danube water coming into the Danube-Dniestr irrigation system should also be noted. We are also involved together with the UkSSR Academy of Sciences Hydrobiology Institute and other collectives in a major comprehensive work on ecological prediction in connection with creating the Lower Dnieper hydrosystem and the prospects of redistributing the river drainage to the south of our republic.

...Research on ecological provision of our national economy is in many ways new and quite varied. Therefore, it is quite complex and requires a fundamental basis.

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- END -